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AN

ELEMENTARY TREATISE

ON

LOGIC;

COMPRISING THE

ESSENTIAL PRINCIPLES AND DIFFERENT MODES

OF

REASONING,

IN

THE FORM OF QUESTION AND ANSWER.

BY

HEZEKIAH G. UFFORD, A. M.

"Prudens interrogatio est dimidium scientiæ."—BACON.

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"An Elementary Treatise on Logic; comprising the essential Principles and different Modes of Reasoning, in the form of Question and Answer By Hezekiah G. Ufford, A. M. "Prudens interrogatio est dimidium scientiæ." Bacon."

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PREFACE.

The many able productions of modern writers, on subjects connected with logic, have contributed, in no small degree, to ascertain the principles, and extend the boundaries of this science.

The advanced state of intellectual philosophy, has led to new and more successful methods of investigating truth, from a more perfect developement of the powers and operations of the human mind. In consequence of the various researches which have been made in moral and metaphysical science, the several kinds of evidence, and those first principles which form the foundations of reasoning, have been more accurately distinguished and established upon a firmer basis. These, by exhibiting in a clearer light the varieties of moral evidence particularly ; by furnishing those elements and principles which assist us in reasoning on facts, and subjects of probability ; and by suggesting rules for directing the understanding in the discovery and communication of truth ; are sources, from which logic has received important accessions and improvements.

Most of the systems of logic in common use, having been formed at a period prior to such improvements, are not only deficient in these particulars ; but contain principles which have been superseded by later discoveries, and also much superfluous matter, which renders them too prolix and unwieldy to be used in seminaries of learning. In preparing an elementary work for the use of those who are commencing this study, an author's chief province consists in making a judicious selection from the materials already extant; and in presenting the subject unincumbered with the extraneous matter, the needless distinctions, and perplexing subtleties, which are contained in the ancient systems. A concise treatise, exhibiting in a simple and perspicuous manner, the essential principles of this science, the knowledge of which might be acquired in a short time, with comparative ease and pleasure on the part of the learner; has long been considered a desideratum in the system of elementary education. In such a treatise, to combine as much solid and useful instruction as possible, and in as compressed a manner, as is consistent with perspicuity, should be a leading object.

Accordingly the writer has, with few exceptions, adhered to the most approved authorities, in the principles and doctrines which he has advanced; rather than indulge in new theories, or attempt to a great extent, originality of matter, and novelty of illustration, which might be less substantial and valid.

In seminaries of learning, until recently, Duncan's logic has been generally preferred, as containing more science than any other; although the obscurity of his manner is such, as to render it in many parts difficult to be understood.

The most important principles and topics contained in this author, so far as they could be accommodated to the present state of intellectual philosophy, have been introduced into this work. The doctrine of ideas, particularly, as treated by him and others; has been deemed too important a part of the science, to be omitted in a system of logic. Among the late improvements in logic, and by an American author, may be ranked the Elements of this science by Professor Hedge, of Cambridge College. His valuable work did not come under the notice of the writer till after the commencement of this treatise. He has taken the liberty to avail himself of some of its divisions and illustrations, and is happy to pay a tribute to its worth. Wherever original passages in this author have been quoted entire, credit is given in the usual way. The opinions of several eminent writers he has frequently quoted; sometimes as authorities to fortify his own doctrines, at other times, because the passages entire expressed the sentiments better than they could be expressed in different language.

In offering to the public a logical treatise in the form of question and answer, the writer would state the reasons which, in his view, recommend the adoption of this mode, in communicating instruction on a subject of science.

The definitions and distinctions in logic, as well as the principles and precepts which it explains and illustrates, are, for the most part, detached and unconnected in their nature ; hence, they become more simple and easy of comprehension when exhibited to the mind in separate and minute parts.

They consist chiefly of distinct propositions, accompanied by the reasons and proofs by which they are supported, and have no strict dependence, the one on the other as is the case in mathematical science ; in which, the parts that are known, must always precede and conduct to those which are unknown.

Besides, that continuity of propositions, and chain of principles, so studiously kept up in some logical treatises, tend to perplex and embarrass the learner, and in many instances prevent his obtaining any distinct knowledge of the subject: especially when in the progress of a long section, there is no marked distinction between the propositions to be proved, and those which contain the proofs; between the principal and the subordinate; and consequently, no leading thread to guide him through the labyrinth of thought, or to aid his memory in retracing his steps.

This embarrassment on the part of the learner, is successfully relieved by the mode of question and answer; which accommodates itself happily to the subjects of logic, and possesses the advantage in all respects, except in so far as it precludes those verbal connexions, and easy transitions of style, which are preserved in the customary mode of writing.

Again—the usual objection to this mode of communicating instruction, "that it too much abridges the labour of the student, and prevents mental exertion," does not apply to the subject of logic, as treated in this work. Here the questions and answers are so adjusted, as to put the *onus probandi* upon the pupil; and generally, the question contains a proposition which is to be proved or illustrated in the answer; to do which, must require previous study, and a comprehension of the subject. Here also, the several topics of inquiry are brought to a point in the questions, and the pupil is led directly to the reasons and principles upon which the knowledge of them depends, instead of being lost in vague and indistinct views of the subject; and consequently, unable to recite any part of it correctly, from his not previously distinguishing what points of inquiry were important to be answered. In a word, the main object of the catechetical mode, is to overcome, or at least to lessen, the difficulty of comprehending logic ; which difficulty has hitherto excluded this study from the minor seminaries of learning, and has consequently confined the knowledge of it almost exclusively to the learned professions. If the essentials of this science can be acquired with much more ease and expedition in the interrogative, than in the usual didactic form ; the object is attained. It will place the knowledge of logic in the power of multitudes, by whom it would otherwise be unattainable. To youthful minds especially, and to those who are self-taught, this seems a mode best adapted for rendering the study easy and inviting ; which, by removing those obstacles that lie at the threshold, may encourage and stimulate them to farther inquiries. In this manner also, it may hereafter be among the means of extending to all our academical institutions, a knowledge of those elements and principles of reasoning, which are of essential use to persons in every department of life.

This summary embraces all the topics of logic, which are contained in the larger systems ; while the parts are dwelt upon in such proportion as their comparative importance seemed to require ; and as the size of the work, considered as a text book, would permit.

To those who have opportunity for further research on this subject, it will be a good preparative for reading with advantage the more extensive systems of logic and intellectual philosophy. It will probably be found, that in some parts of this treatise, there is not a sufficient number of examples and illustrations to render the principles clear, and to show their application. To have inserted a greater number of these, would have too much swelled the size of the work, and have marred the connexion. A remedy may be readily supplied by every intelligent instructor from his own resources; in doing which, besides benefiting his pupils, he may find an exercise for his own logical skill; in which he might otherwise feel his province to be abridged, by the catechetical mode of treating the subject. With these impressions of the work, the writer respectfully submits it to the public, and especially to those gentlemen who superintend the education of youth.

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INTRODUCTION.

The design of Logic is to unfold to the mind the origin and foundation of its knowledge, and to direct the intellectual powers in the investigation of truth, and in the communication of it to others.

Although *truth*, the object of our inquiries, has its foundation principally in things without, yet the subject of Logic is chiefly the human understanding; the leading faculties and operations of which it explains, and traces the progress of its acquisitions from the first perceptions of outward objects, through the several modifications of ideas, and all those numerous judgments and deductions which result from comparing them one with another.

By thus becoming acquainted with the several intellectual powers and processes, we are taught the right use and application of our rational faculties.

Logic treats of the distinctions of ideas, of their elements and combinations; it instructs us in the correct use and definition of terms, and distinguishes their various kinds.

It developes the several sorts and sources of evidence upon which our judgments are founded; describes the varieties of propositions, their properties and constituent parts.

It likewise explains the different kinds and modes of reasoning; teaches the nature of the principles, the force of the proofs, and the validity of the conclusions peculiar to each; as also the forms of argumentation.

In the last place, it illustrates those methods of classification and arrangement, which facilitate investigation, aid the memory, and enable us to communicate clearly and systematically the knowledge which we have acquired.

This science, not only assists us to *think*, to *judge*, and to *reason* correctly, but the knowledge of it is essential to a thorough understanding of rhetoric and of grammar.

The principles and rules of Logic, it is admitted, are insufficient to form an expert reasoner, without a careful exercise of the reasoning faculty on a variety of subjects, and attention to the best models of argumentation ; yet they furnish the mind with the necessary means and instruments for aiding its investigations and discoveries, and also for distinguishing truth from the specious impositions of sophistry, and from the errors of prejudice and early association.

In the following treatise, the subjects of Logic are distributed into four parts, according to the four leading operations of the mind—viz. Perception, Judgment, Reasoning, and Method. This ancient division, though not an arbitrary one, has nevertheless been departed from by respectable modern writers, each of whom has adopted an arrangement and division of his own.

ELEMENTS OF LOGIC.

PART FIRST.

A DESCRIPTION OF THE LEADING FACULTIES AND OPERATIONS OF THE MIND—OF IDEAS, TERMS, AND DEFINITIONS.

Perception, the first part of Logic, treats of the operations by which the mind gains its original knowledge of the various objects with which it is conversant, whence it is furnished with the materials of thought and of communication.

It may therefore be divided into two chapters; one, explaining those mental operations and the objects of them, from which result the several classes of ideas; the other, treating of terms and definitions.

CHAPTER I.

Of Perception and the organs by which it is exerted—of the objects of conception, and the operations of the mind employed about them—of Ideas, their sources and different sorts.

SECTION FIRST.

OF PERCEPTION.

Question. What is Perception ?

Answer. *Perception is that faculty by which we learn the existence and properties of external objects through the medium of the senses.*

Illus. By means of the organs of sense, the eye, the ear, the touch, &c. we converse with outward objects and discover their properties, such as colour, figure, solidity, extension, and the like ; and such mental notices of things are acts of perception.

Obs. Perception expresses what is common to all the senses, and is not confined to sight only. The immediate object of perception must be something present, or within the reach of our outward senses. The faculty by which we form an idea of what is past or absent, is called *conception.*

Q. What is there peculiar in the faculty of perception ?

A. As this is the first mental faculty which is brought into exercise, so it is by this operation that knowledge first enters the mind. By perception we gain all our knowledge of the existence and qualities of material objects, as also of the various changes which take place in the external world around us.*

Obs. Though the word *perception* is more properly confined to the knowledge which we have by our senses of external objects, "*yet the same word is often applied to our knowledge of speculative truth.*"—Stewart. Hence the phrases, *intuitive perception*, *moral perception*, *perception of the agreement of ideas and of relations ;* consciousness also is styled *internal perception.* In this extensive sense it applies to all the objects which come under the direct and immediate view of the mind, and thus it is understood when it is made the first division of logic.

Q. Does the mind perceive external things mediately or immediately ?

---

* "Perception is the first operation of all our intellectual faculties, and the inlet of all knowledge into our minds."

Locke's Essay, Book ii. *Chap.* 9.

A. There are impressions made by outward objects on the organs of sense, which are followed by sensations in the mind, previous to perception; so far our perception of things is, by means of outward impressions and inward sensations.

Q. But is it things themselves that we perceive, or only certain images of things, which some have supposed to enter the mind, and to which they have improperly given the name of ideas?

A. "It is external objects themselves, and not any species or images of these objects that the mind perceives."—*Stewart's Elem. Chap.* 1. *Sec.* 2.

The supposition that images of outward objects are formed in the brain, and are there perceived by the mind, is absurd, as has been abundantly shown by Dr. Reid.

Obs. Although there are impressions made by outward objects upon the organs of sense, the nerves, and the brain, "and these are followed by sensations in the mind, which are the constant antecedents of our perceptions of objects; yet all the steps of this process are equally incomprehensible, and can throw no light on the manner in which we acquire the knowledge of the existence and qualities of body."—*Stewart, ibid.*

Q. Which are the instruments of perception?

A. These are the five corporeal senses, viz.—seeing, feeling, hearing, tasting, smelling. Each of these senses has its separate office in giving us the knowledge of the several objects around us.

Q. Why are the bodily organs called organs of sense?

A. Because, by these, all sensation is communicated to the mind, taking the sense of touch in the most extensive application as diffused over the whole corporeal frame.

"In what manner the mind carries on an intercourse with the material world, by means of these organs, and gains the knowledge of things without, philosophy has not yet been able to explain."—*Scott's Elem.* p. 47.

Obs. External things, because they are perceived by the senses, are called *objects of sense.*

Q. How is sensation connected with perception?

A. The faculty by which we experience pleasing or painful effects from various objects through the medium of the senses, is properly *sensation.*

Perception, which is a different faculty, by means of these effects or sensations, takes knowledge of the objects without.

Q. What is another distinction?

A. Perception always implies some external object, of whose existence we have a full conviction. To those internal sensations which cannot be traced to any external object as their cause, we do not apply the word perception; but we are said to *feel* pain, or to be *conscious* of it, to be *sensible* of hunger, thirst, and the like.

Q. How is perception the leading faculty in furnishing the mind with ideas?

A. The knowledge that we have by perception of some quality in the object, when retained by the mind after the object is withdrawn, is usually called an *idea*, or notion.* Thus, after we have had perceptions of objects, by seeing, hearing, touching, tasting, or smelling, we are able to form ideas or notions of them when they are absent.

Q. What is meant by the *archetypes* of our ideas?

A. The object or quality perceived, when afterwards it becomes an object of thought, of which we form an idea, is called the archetype of the idea. Thus, a horse, or a tree, or any particular qualities, as black, white, hard, soft, are objects of perception; and the same are also archetypes of our ideas.

Obs. In proportion as any of the organs of sense are impaired or defective, the perception is blunted and rendered indistinct; so entirely is the mind indebted to the bodily organs for its exercise of outward perception.

All clear and distinct notions of material objects must be acquired by a careful and attentive examination of them by our senses; inasmuch as the perceptions of sense are the elements of all our knowledge, beyond which, our ideas of bodies and their qualities cannot extend.

---

* "It has been the prevailing opinion among philosophers, that ideas are *objects of thought* existing in the mind distinct from the mind itself; also that these ideas, and not things themselves, are the objects about which our thoughts are employed." Says Mr. Stewart, "it is to Dr. Reid that we owe the important remark that all these notions are wholly hypothetical; and, continues he, we have no ground for supposing, that in any one operation of the mind, there exists in it an object distinct from the mind itself."—*Elem. Chap.* 4. *Sec.* 2.

"In popular language," says Dr. Reid, "idea signifies the same as conception, apprehension, notion. To have an idea of any thing, is to conceive it. To have a distinct idea, is to conceive it distinctly. To have no idea of it, is not to conceive it at all."

In this popular sense, the word *idea* will be employed in the present work.

SECTION SECOND.

CONSCIOUSNESS AND REFLECTION.

Q. What is consciousness?

A. *Consciousness is that faculty, by which the various operations of our own minds are made known to us.*

Its office is, to notice the operations of the other mental faculties, and to inform us of the present thoughts and purposes of our own minds.

Illus. In any familiar process of investigation, for instance—the mind may exert the several acts of conceiving, comparing, judging, assenting, willing, and purposing; and such distinct operations of our minds, together with the whole current of thought which is perpetually flowing, during our waking hours, pass in review under the eye of our consciousness.

Q. What are some of the other subjects of our consciousness?

A. Besides the several *mental* operations, our various sensations, passions, desires, affections, volitions, motives, and intentions, all fall under the cognizance of consciousness. Thus we are conscious of all our present thoughts and feelings, and of whatever is passing in our minds.

Obs. Consciousness is transient and momentary, regarding only the present thoughts and operations, as they exist in the mind; so that the consciousness we have this moment, cannot be the same consciousness that we had the last moment, but only one that is similar, or of the same kind.—*Reid. Essay* 3.

Q. In what respects is consciousness similar to perception?

A. Consciousness, like perception, affords us immediate knowledge of things present: the latter, of external objects; the former, of the feelings and operations of our mind. They are both involuntary operations, inasmuch as the knowledge of things subjected to their observation is gained in each case without any act of the will; notwithstanding, it may be rendered more clear and distinct by an increased effort of attention.

Q. What are the peculiar effects of *attention*?

A. Attention has a surprising influence in aiding and improving our perceptive powers, as well as all our faculties. The different employment of attention is what occasions the vast difference in persons possessing similar advantages, in regard to the correctness and extent of their information.

In illustration of this, "One man, (says Aikin,) passes through the world with his eyes open, and another with them shut; and upon this difference depends the superiority of knowledge which the one acquires above the other."

Obs. Attention is not generally considered a separate faculty of the mind. "If it be a peculiar faculty, it must be a generally assisting faculty, which comes occasionally to the help of all the others, to give them clearer views of their several objects."—*Scott's Int. Philos.* p. 283.

Reflection.

Q. What is reflection?

A. *Reflection is the deliberate examination of the operations of our own minds, in connexion with the objects about which they have been employed.*

"In this more common, and therefore more proper sense of the word, (says Dr. Reid,) reflection is applied to many other operations of the mind, with more propriety than to consciousness. We reflect when we remember, or call to mind what is past, and survey it with attention. We reflect when we define, when we distinguish, when we judge, when we reason, whether about things material or intellectual."—*Int. Pow. Essay* 3. ch. 5.

The use of the word reflection, in this extensive sense, is sanctioned by the ancient and well known distinction between the *direct* and *reflex* acts of the mind, the former being made the objects of the latter.

Q. What is included in reflection?

A. This reflection is not one power of the mind, it comprehends many; such as recollection, attention, distinguishing, comparing, and judging. "This power of the understanding, to make its own operations its object, to attend to them, to examine them on all sides, is the power of reflection, by which alone we can have any distinct notions of the powers of our own, or of other minds."—*Essay* 1. *chap.* 5.

Q. In what respects chiefly does reflection differ from consciousness?

A. Consciousness is involuntary and of no continuance, changing with every thought. It notices only things present in the mind, and does not extend to the past, delivering that over to memory.

Reflection is a voluntary and sedulous employment of the mind, on former operations, either of consciousness, of sense, or of memory; and at the same time, this mental process, like all others, falls under the present notice of consciousness.

Obs. All men, and even children, are *conscious* of the operations of their own minds, but there are few who *reflect* upon them, and make them objects of thought; their minds being turned solely to the external objects which engage their attention. Hence, says Mr. Locke, "The understanding, like the eye, while it makes us see and perceive all other things, takes no notice of itself; it requires art and pains to set it at a distance, and make it its own object."

Some ripeness of understanding is necessary, in order to be capable of reflection. Of all the powers of the mind, it seems to be the last that unfolds itself. Most men seem incapable of acquiring it in any considerable degree."—*Reid. Essays* 1 & 6.

Q. What class of our ideas do we derive from consciousness and reflection?

A. From these we get all our ideas of things belonging to the mind, as by the operation of our external senses, which is styled perception, we get all our ideas of material objects and their attributes.

Obs. Our notions of the more obvious operations and states of our own minds, which are known by consciousness without reflection, may be called *ideas of consciousness.*

Those more distinct and accurate conceptions of our several mental operations, and the objects of them, which we gain by reflecting upon them with discrimination and judgment, are properly *ideas of reflection.*—*Vide Section 4th* & 10*th*.

SECTION THIRD.

OBJECTS OF OUR KNOWLEDGE.

I. *Substances.*

Q. What is a substance?

A. *A substance*, as usually defined, *is a thing which subsists of itself, without dependence upon any created being, and is the subject of modes or attributes.*

Obs. By a substance, in common language, is understood a material body, including all those properties and qualities, which are known by experience to belong to bodies of such a name. Thus, the words iron, wood, stone, denote the aggregate of all the known properties of those bodies.

But, in a philosophical sense, substance includes only the single idea of self-subsistence divested of all its properties; and in this sense the word is applicable both to body and mind.

Q. What two kinds of substances are there?

A. Material substances, or bodies, and immaterial substances, or spirits.

Q. How far does our knowledge of substances extend?

A. It extends only to their qualities and attributes which are obvious to the senses, and to their powers and component parts, in so far as they have been ascertained by experience and philosophy; but we have no knowledge of the essences of bodies.

Obs. All that we know of body is its properties, and all that we know of mind is its attributes and operations; besides these, we conceive some unknown support, or cause of the union of properties both in body and in mind; but of this we have only a remote and relative conception.

Q. What is meant by the essence of a body?

A. The peculiar internal structure and conformation of the minute particles in any species of body, from which its sensible qualities are supposed to flow, is called its essence.

Obs. All the diversities in material substances, occasioning the different species, as metals, minerals, vegetables, fluids, &c. are supposed to arise entirely from this differ-

heir inward structure, that is, from a difference in
ences; while the original matter in all is suppos-
the same.

hy do we conclude that bodies and spirits are en-
distinct substances?

A. Because the properties of the one are wholly unlike those of the other. Matter, in its simple particles, possesses not the power of thinking, willing, and the like; nor can it, by any composition or modification of its particles, become endued with intelligence; but intelligence, or the power of thinking, is inseparable from the nature of spirit, which is considered a simple, unextended, indivisible substance.

Q. How do we conceive of the nature and properties of spirits?

A. It is rational to conclude, that knowledge in them is the same as it is in us; and that they possess mental powers the same in kind with ours, only in higher degrees of perfection. Hence, in conceiving them as of different species, according to the superiority they are supposed to possess in the scale of being, we ascribe to them whatever is most excellent in ourselves, as knowledge, thinking, foresight, &c. and these in different measures, according to the station peculiar to each rank and species.

Q. How do we form our natural conceptions of the Deity?

A. By first considering our own mental powers: we then conceive of the Divine attributes as similar to our own, but at the same time free from all imperfection, and extended to infinite. It is in this manner by analogy only, that we can conceive of the Divine nature and attributes. But to render our conceptions of the Divine character just and adequate, they must include the various exhibitions which God has made of his perfections and purposes in his word and works.

II. *Modes.*

Q. What is a mode?

A. A mode, or *manner of being*, is some property, quality, or state of a thing, which cannot subsist apart from the substance to which it belongs, and on which it depends as its subject.

Example. Thus, hard, weighty, crooked, round, are properties or *modes* of body; and intelligent, honest, devout, doubting, judging, wisdom, and folly, are *modes* or attributes of mind. But neither the modes of body nor of mind can, as we conceive, subsist of themselves, but they subsist by the help of some principle of support, or *substance*, in which they inhere.

Q. What may be further observed about the terms *substance* and *mode?*

A. The term *substance*, in the philosophical sense, denotes merely an unknown principle of support and union of properties, either in body or in mind. The term *mode*, extends to all attributes whatsoever, and includes the most essential and inward properties of things, as well as outward actions and relations.—*Watts' Logic, Part* 1. *Sec.* 3.

Q. What is the principal division of modes?

A. Into essential and accidental modes. Thus, solidity, extension, figure, are essential modes of body, and thinking and consciousness are essential modes of spirit; because they belong to the very nature of the subjects in which they are, and the subject can never have the same nature without them. But the colour, shape, size, motion, roughness or smoothness of bodies, are accidental modes, since these may be changed or separated from body, and yet its nature remain the same.

Obs. Several other divisions of modes are treated of by some writers on logic, such as primary and secondary, absolute and relative modes, as well as intrinsical and extrinsical, physical and moral, &c.

III. *Relations.*

Q. What is a relation?

A. *A relation is the state of an object comparatively to another object.* A relation is discerned only by a comparative view of the objects related, since it does not exist in one object alone, independently of its connexion with some other object; it is therefore said to subsist between them. Thus the relation between father and son.

Q. Can you enumerate the more obvious sorts of relations?

A. 1. The relation of cause and effect, which is suggested to us by all the changes which we notice in nature, and by all our own voluntary actions. From these we get the ideas of agent or cause, and of effect or thing produced, and discern the connexion or relation between them.

2. The relation of identity or sameness. This relation we discover when any person, object, or idea, is known by us to be the same which we have known before.

3. The relation of equality, which we discover to exist between two objects which do not differ by any excess or defect, either in quantity, number, value, and the like. This is the relation on which all mathematical reasonings are founded.

4. The relation of similitude or likeness, which is perceived to subsist between things that resemble each other in some important particulars. This relation of similitude is the foundation of all classification.

5. Relations of time, denoted by such words as older, younger, sooner, later, present, past, and future.

6. Relations of place, signified by the words near, distant, high, low, above, around.

7. Natural relations, as father, brother, cousin.

8. Civil relations, as of king and subject, master and servant, patron and client. Such reciprocal relations are correlatives.

9. Relation of actions to a law or standard of right, and the relation of creatures to their Creator, and of men to each other, which are moral relations.

Obs. This threefold division of things into substances, modes, and relations, is adopted by Mr. Locke; and it includes all the objects of thought, which have a real existence as archetypes of our ideas.

SECTION FOURTH.

ORIGIN OF OUR KNOWLEDGE AND IDEAS.

Q. What are the two great sources of our knowledge?

A. The sources from which we derive our original notions and ideas, are, first, Sensation, and, secondly, Consciousness and Reflection.

Q. What are ideas of sensation?

A. All ideas of external objects and their properties, the knowledge of which is first gained by the senses. Such, for example, are our notions of colours, of sounds, of hardness, extension, motion, and, in short, of all the qualities and modes of material objects.

Q. How does it appear that the first knowledge we have, is by sensation ?

A. As the mind possesses no innate ideas, and no materials of knowledge, within itself originally; so it never employs itself in thinking, nor awakes to a consciousness of its own existence, until its faculties are first called into exercise by outward objects. The first notions which we have, are evidently of things without; the perceptions of sense being the primary inlets of knowledge to the mind.

Obs. These operations of the mind respecting things without, and the notions thence derived, becoming afterward subjects of consciousness and reflection, furnish our first notions of things within.

Q. What fact proves that we derive all our knowledge of external objects by means of the bodily senses ?

A. "If either of the senses be wholly wanting, the mind must be for ever destitute of all that class of ideas which it is the office of that sense to furnish." Thus, a man born blind has no ideas of light and colours, and one born deaf can form no conception of sounds. The same would be true of the objects of the other senses, could we suppose a person to be entirely deprived of them all; and, consequently he must remain destitute of all knowledge.

Note.—Mr. Stewart supposes a person possessed of no senses, except those of hearing and smelling; and then by his mere internal sensations, without any knowledge of external objects, he would be led to exercise many of his important faculties, become conscious of his own existence, learn the nature of his own mental powers, and be capable of improving his knowledge of mind.—Page 86.

Q. What are ideas of REFLECTION ?

A. *They are the notions which we form of the subjects of our own consciousness, upon examination of them by our reflective powers.—Stewart, chap.* 1. *sec.* 4.

Thus, when the mind attentively turns its view inward, and reflects upon its own operations, and its previous notices of things recalled by memory, it derives from these internal objects a new set of notions more clear and distinct than those received by the senses, which are termed *ideas of reflection.*

Coroll. Sensation, therefore, must necessarily precede reflection, since the former furnishes the subjects on which alone the latter can operate.

Q. What are commonly included under the denomination of ideas of reflection?

A. Among these are included the ideas which we form of our own mental operations; such as perception, thinking, remembering, judging, willing, purposing, believing, and the like. Also ideas of an intellectual nature; such are those of time, of number, of cause and effect: and again, most of our notions of the agreements and differences of things, and of relations in general, which are the result of comparison and judgment.

Dr. Reid remarks, "as it is by reflection upon the operations of our own minds that we can form any distinct and accurate notions of them, and not by consciousness without reflection; so is it by reflection upon the objects of sense, and not by the senses without reflection, that we can form distinct notions of them.

Reflection upon any thing, whether external or internal, makes it an object of our intellectual powers, by which we survey it on all sides, and form such judgments of it as appear to be just and true."—*Essay* 6, *chap.* 1.

Q. Why may ideas of relation for the most part be considered ideas of reflection?

A. Excepting those external relations of things which are obvious to the senses, the ideas of which may therefore be referred to sensation as their origin; all other relations are the objects of reflection. Thus mathematical and metaphysical relations are discerned by intellect; moral relations, by conscience or the moral sense: hence the ideas thence resulting, are more properly ideas of reflection. "I apprehend, (says Dr. Reid,) that all our notions of relations may more properly be ascribed to judgment as their source and origin, than to any other power of the mind."—*Ibid.*

Scholium 1. The objects of sense with which we are surrounded, give rise to the exercise of our mental faculties, and furnish the mind, by means of perception, with those numerous original notions which are the elements of all our knowledge. By reflection upon these objects, and upon the operations of the mind employed about them, we by degrees derive a new class of notions more clear and distinct than the former, which become the fit materials of our future reasonings and discoveries.

2. Among all the acquisitions of our knowledge, and

that infinite variety of conceptions, judgments, and complex views that are ever formed by the mind; we shall not be able to find one original idea which we have not derived either from sensation or reflection; nor one combination which is not made up of these original ideas, as the materials or ingredients of it.

SECTION FIFTH..

ANALYSIS.

Q. What are those faculties of the mind which we employ in modifying our original notions both of sensation and of consciousness?

A. They are these four, viz. *Analysis*, *Abstraction*, *Comparison*, and *Combination.*

Q. What is Analysis?

A. The word *analysis*, when employed in chemistry, anatomy, or botany, signifies an actual decomposition of what is complex into its constituent elements; but as a mental operation, *to analyze, is nothing more than to distinguish successively, the several parts of any compound subject.*

Example. Thus we analyze any compound number, as a hundred, by distinguishing in our minds the several collections of tens, and then the several units or simple parts that compose it.

Q. What is the office of analysis, when employed about our first notions of material objects?

A. Our first notions of material things are not simple, but complex like their objects. But after we attain to a more perfect use of our faculties, we have the power of analyzing the objects of nature, of distinguishing their several attributes, of conceiving them one by one, and of forming simple ideas of their separate qualities.

Ex. Thus, our notions of extension, and solidity, of length and breadth, of colour and figure, of a point and a surface, are simple ideas, which are gained by analyzing complex objects: but these are the elements or simple parts of which our conception of a body is made up; and we cannot have a distinct and adequate notion of the whole compound, until we can distinguish it into its simple parts, and then unite the parts again, so as to restore the combination.

"The simplest objects of sense appear both complex and indistinct, until by abstraction, they are analyzed into their simple parts."—*Reid.*

Q. At what period do we commence the process of analyzing?

A. We commence it in some degree at the earliest period of improvement, when we first learn to distinguish the more obvious properties of things that fall under our observation. The first notion that a child has of an object of sight presented before him, is that of a confused whole. A longer acquaintance with the object will give him the notion of a coloured surface, of a certain form and dimension; which qualities, however, he is as yet unable to separate in his mind. Suppose this object to be an apple, for instance; by successive examinations of it, he acquires a notion of its shape, hardness, and weight, and of its taste and smell; but until the power of analyzing and the use of language shall have taught him to separate and combine these several properties in his mind, they will remain blended and confused in his conception of the object.

Corol. Hence an infant may have perceptions of several qualities of an object successively; but to have distinct simple ideas of complex bodies, is the result of experience and analysis.

Q. What does Dr. Reid remark upon this subject?

A. "Brute animals, which have the same senses that we have, cannot separate the different qualities belonging to the same subject, and have only a complex and confused notion of the whole; such also would be our notions of the objects of sense, if we had not superior powers of understanding, by which we analyze the complex object, abstract every particular attribute from the rest, and form a distinct conception of it."—*Int. Pow. Essay* 6. *chap.* 3.

Obs. It has been said, *that a child ordinarily receives the most of his simple ideas before he is three years old.* It is true he may have *perceptions* of most of the single qualities of external objects previous to this period, but yet not have distinct simple ideas. Mr. Locke's opinion also, that "*the soul begins to have ideas as soon as it begins to perceive,* and that our first ideas are simple," is owing to his not rightly distinguishing between perceptions and ideas, which he calls the same.

Q. Do we gain our simple ideas of the subjects of consciousness by analysis?

A. Thoughts, affections, and operations of the mind, are analyzed in the same manner as objects of sense. Nature presents no object to the senses, or to consciousness, that is not complex. It is by the power of analyzing and abstraction, that we gain the most distinct notions of the complex operations of our own minds.

Example. Thus by analysis, we gain simple ideas of perception, thinking, comparing, judging, remembering, willing, and the like, which are, separately considered, simple acts of the mind.

Q. How are moral qualities and actions analyzed?

A. Thus, for instance; justice, honesty, prudence, mercy, and benevolence, are combinations, or assemblages, of certain qualities, actions, and intentions; and these may be analyzed into their simple elements, by commencing with the leading and obvious parts, and proceeding to those which are more remote and minute.

In like manner we employ analysis when we make any complex idea, as piety, charity, temperance, a subject or theme of discourse. The analysis consists in distinguishing the subject into its several divisions and subdivisions; in tracing the nature, the causes, and effects, the relations and uses of the thing under consideration; and also what are the opposites of it.

Q. What is another purpose and use of analysis?

A. Analysis enables us to investigate causes by their effects. Also we analyze any treatise or discourse, when we mark its several divisions and distinct heads, its various subjects and arguments, and are able to see the mutual connexion and subserviency of the parts to the whole, so as to have a comprehension of the general plan.

Analysis will be more fully explained under the head of Method, part fourth.

SECTION SIXTH.

ABSTRACTION.

Q. What is meant by abstraction?

A. *Abstraction is the act of considering one or more of the properties or circumstances of an object apart from the rest,* whereby we withdraw it in our minds both from the object itself, as well as from other associated properties, in order to contemplate it alone.

Example. Thus, we may conceive of whiteness in paper, of hardness in marble, of sweetness in sugar, of motivity in mind, or of gravity in body, without attending to the other properties of these substances.

Observation. This act differs from analysis chiefly in this, that abstraction is only the separate consideration of some one of the simple parts into which a compound subject, or any assemblage of nature, may be analyzed. Some philosophers consider both as only one process, which they term abstraction.

Q. How is abstraction further illustrated?

A. For example, we speak about the length, the breadth, the centre, and circumference, the plane and diameter, and other simple properties of objects; and we can reason about these abstract properties, which are mentally separated from all others, as if they were separate existences, although they are no where to be found, but in conjunction with other properties in the same subject.

Q. What may be further noticed respecting abstraction?

A. Until the mind is accustomed to abstraction, it is unable to conceive of those simple properties and relations of things, and to form those simple ideas which enter into subjects of science. Hence, beginners in the study of mathematics, find it difficult to conceive the meaning of the terms, and to understand the propositions pertaining to that science. "Such ideas can find no admittance into a mind that has not some degree of judgment."—*Reid*, p. 91. Says Professor Scott, "in proportion as a man familiarizes himself in the exercises of abstraction, and accustoms himself to consider what are the distinguishing characteristics of the various objects of his contemplation, and what they have in common with others, does he fit himself for scientific pursuits." p. 109.

Q. What is Mr. Stewarts remark?

A. "We can reason," he says, "about breadth abstracted from every other dimension, although surely no understanding can make length without breadth an object of conception."—*Elem. Ch.* 4. *Sec.* 1.

Obs. If by conception we mean *a representation of an object to our own minds*, it is evident we cannot make length without breadth an object of steady conception, any more than we can conceive of smoothness, or crookedness, without some substance which is smooth or crooked. Length without breadth, is *intelligible*, and may be an object of thought, but not of distinct and exclusive conception.

In like manner many things are intelligible which are not conceivable.—*Kirwan*, *chap*. 8. *sec*. 4.

Q. How is abstraction connected with another operation of the mind, which is termed classification or generalization?

A. This power of abstraction, or of separating the qualities combined in the objects that fall under our observation, and of tracing the same quality in a multitude of objects, is the foundation of all classification. For it is in consequence of discovering the same properties in many individuals, that we are able to assign them all to one class; or, which is the same thing, to apply one common name to all the individuals composing the class.

Q. What is implied in the faculty of classifying, or generalizing things?

A. "Generalizing implies no more than the capacity of employing general terms," to denote a greater or less number of individuals, whether substances, attributes, or events, according as they resemble each other. Thus, *tree* denotes a class of subtances, *straight* a class of attributes, and *falling*, a class of events; in like manner all general words stand for classes.

Obs. The several sorts of natural objects, are the work of the Creator; as are also all those events and phenomena in nature, which by reason of their uniformity are collected by philosophers under general laws. The former are *classified* by comprehending many similar individuals under one general name; and the latter are *generalized*, according as they are found to unite in one general law. The whole that man does in the formation of genera and species, is to trace the resemblances and differences in things; on account of which they are entitled to the same or different generic appellations, and then to apply the general names accordingly.

Q. How do we acquire our notions of classes, and learn the application of general words?

A. In the understanding of a child, general words, such as man, house, town, tree, signify only one individual of the class, to which he first learns to apply the name. As he becomes acquainted with other similar objects, and hears them called by the same name, he learns by degrees to employ the same word to express any one of a whole class; and that it stands for any indefinite number of individuals that resemble each other.

Obs. This simple account of the manner in which we learn the nature and application of general words, is satisfactory, and explains what is the meaning or notion annexed to a general term, without entering into all the theories of philosophers about general natures, universal essences and ideas, abstract general conceptions, and such like *inconceivables.*

Q. What sort of idea is that which we have of a class of things?

A. That certain properties are common to all the individuals of a class, is a *general fact,* a matter of belief and conviction; and is not a general nature, which may become the object of the understanding and the archetype of a general idea. Hence the idea we have, when we think of a class of things, is either that of an individual, which may represent an indefinite number of other individuals of the same sort; or it is the belief of a general fact or proposition, which holds true of all the individuals of the class. In either case, therefore, it is a particular, and not a general idea.

Q. What further distinction may be noticed relative to general terms?

A. General terms have a general meaning or applicability, but yet they excite no general conception or representation of the class of things they denote. Their general meaning is *intelligible* as a fact, just as the general fact of gravitation is intelligible; but yet, "since no general thing exists, but all existing things are particular, we are constrained to admit the *conclusion,* that there is nothing universal but names."—*Hobbes' Tripos, chap.* 5, *sec.* 6.*

Q. How may abstraction be further illustrated, as it is concerned in generalizing?

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* The same philosopher remarks, "The universality of one name to many things hath been the cause that men think the things themselves are universal."

A. By the power of abstraction we may attend to whiteness in paper as a simple quality; the same quality we can then trace in many other things, as in snow, chalk, ivory, &c. and thus the term whiteness stands for the same quality wherever it exists. In like manner, the words blue, red, green, are general terms, applicable to those several classes of colours; and so all the words in the language are general and denote classes, except proper names, which are limited to individuals.

SECTION SEVENTH.

COMPARING.

Q. What is comparing?

A. *Comparing is the act of contemplating two things in reference to each other.*

Ex. Thus, when we say that lead is heavier than marble, and marble is harder than lead, we state a comparison between the two substances, with respect to the degrees in which they possess the qualities of weight and hardness.

Q. What class of our ideas do we derive from comparison?

A. From comparison we derive all our ideas of relation; since it is only by comparing together things related, that we can discover the relations which subsist between them. Such are our ideas of father, uncle, friend, enemy, greatness, littleness, superiority, subjection, and the like. All words of a comparative or relative signification, as longer, shorter, farther, nearer, better and worse, imply comparison and indicate relations.

Q. What may be remarked respecting the frequency and extent of our comparisons?

A. No faculty of the mind, except that of thinking in general, appears to be so frequently and variously exerted, as that of comparing. We make comparisons between all the objects with which we become acquainted; and it is by this means that we gain all our notions of agreement and disagreement, of likeness and unlikeness, of sameness and diversity, either in external things, or among our internal thoughts and feelings.

Obs. The power of distinguishing between the several objects that are brought into comparison by the mind, is no other than the power of acquiring knowledge; since all the knowledge that we ever gain by any exertion of our faculties, is the result of discernment, or of distinguishing between things compared.

Q. What are some other offices of comparison?

A. By comparison we are conscious, that any present object of memory or conception, is the same that we have noticed before; and it is by the same operation that we are enabled to give to any object or quality formerly known, its own appropriate name.

Comparison is performed by children, in all their attempts to learn the resemblances and differences of things; and in all their efforts at imitation, by which they acquire the language, manners, and opinions of the persons with whom they associate.

The importance of careful and just comparison, in all correct judgment and reasoning, will be further shown in Part Second and Third.

SECTION EIGHT.

COMBINATION.

Q. What is combination?

A. *Combination is the act of uniting several objects** *of thought, either simple or complex, into one individual or collective assemblage.*

It is therefore just the reverse of analysis. As by analysis, we distinguish the complex objects of nature into their simple qualities and attributes, of which we form simple ideas; so on the contrary, by combination we collect the several parts into one complex whole, in forming a comprehensive idea of the object.

Ex. 1. The word *fever*, for instance, denotes a complex object of sensation; *tree*, denotes a complex object of perception; *heart*, a complex object of consciousness; and *triangle*, a complex object of intellect; but the parts which compose these individual combinations, must be collected and arranged by the mind, in order to a just conception of them.

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* The simple parts and properties of things, as well as the whole compounds are called objects of thought.

2. Also, the words *army*, *flock*, *forest*, *thousand*, are collective nouns, denoting a collection of individuals of the same kind; which assemblages are conceived in the mind, by combining these groups of similar individuals, and representing them in such manner as they have occurred to our observation.

Q. What are the proper objects of this faculty of combination?

A. 1. The real assemblages of nature, such as persons, animals, vegetables, minerals, towns, places, and other natural objects, which have fallen under our observation.

2. All those assemblages of modes or attributes, natural, and moral, of which we form complex notions; such as symmetry, grandeur, wisdom, character, piety, gratitude, a thousand, a month, a furlong.

3. Those combinations denoted by relative words, of a complex meaning; such as superiority, dominion, submission, property, proportion, murder, theft, rebellion, and the like.

4. The several modifications of human actions, and of natural events; such are those of eating, drinking, walking, ploughing, sowing, buying, selling, a dance, a feast, a tempest, an earthquake, a procession, &c.

Obs. 1. These four classes, with their modifications, include the several objects of combination which pertain to real existence, as distinguished from those imaginary representations which have nothing in nature to which they correspond.

*2. The office of combination is to form these assemblages of the objects of thought, by uniting in one whole, the more simple properties and qualities of which they are composed.

The business of conception is to represent these combinations, when formed as one complex object.

Q. How may the separate offices of combination and conception be further illustrated?

A. In case of a visible object, for instance, which is always complex, " our conception of it as a whole, is not instantaneous, but is the result of many conceptions, collecting the attributes and circumstances of it one by one, into one complex whole." "The association of ideas, (or combination) connects the different parts together, and (conception) presents them to the mind in their proper arrangement."— *Stew. Elem. Chap.* 3. *Sec.* 1.

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* See the continuation of this subject, under section 11, of Complex Ideas.

Obs. In those assemblages of mixed modes and relations, which have no real union in nature, the separate office of this faculty of combination is more manifest (than in the case of substances,) in collecting and arranging the various ingredients, that enter into the several compounds.

SECTION NINTH.

CONCEPTION.

Q. What is conception?

A. *Conception is that faculty by which we represent to our minds the objects of any of our other faculties, both simple and complex.*[*]

Illus. Thus, when we reflect upon the nature of some intellectual faculty, as the memory, the judgment, &c. we exercise the faculty of conception upon an object of consciousness; if we reflect upon any particular taste, smell, or feeling, it is exercised upon an object of sensation; if the object of our thoughts be any material body, conception is employed upon an object of perception; if it be a single quality or attribute, it is an object of abstraction; and if it be an assemblage that has no real union in nature, it is an object of association or combination.—*Scott's Elem. Int. Philos. Chap. 5. Sec.* 1.

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[*] Dr. Reid differs from most other philosophers, in his using the word conception in the most unlimited sense, as applicable to every representation formed by the mind, whether of things real or imaginary.

Mr. Stewart, on the contrary, chooses to limit the province of conception to our past sensations, and to the objects of sense that we have formerly perceived; while *that power* by which we form new combinations of our own creation, unlike to any thing that exists, he properly styles imagination.

Professor Scott with great propriety extends the province of conception both to things external and internal, in so far as they are objects of knowledge to any of our other faculties.

Again, Dr. Reid considers conception as implying no belief of the existence of its objects. In this it is remarkable, he admits the *ideal theory* of Mr. Locke, which he has been at so much pains to refute. For evidently, our conceptions are our ideas; and if ideas are formed in the mind, without any belief of the existence of things, their archetypes; then these ideas in the mind, and not things themselves, are the objects about which our thoughts are employed. His doctrine of "abstract general conceptions," is a part of his main theory, and seemed to require it. "Such conceptions," he observes, "imply no existence:" "general attributes have no existence, and therefore our conception of them does not imply existence."—*Essay* 6. *Chap.* 3. It is in handling the doctrine of conception that Dr. Reid nods by turns, according to Horace: *aliquando* "*bonus dormitat Homerus.*"

In opposition to Dr. Reid, Mr. Stewart maintains that conception, as distinguished from imagination, always implies a belief of the existence of its objects.

Q. To what objects is the term conception applicable?

A. The word conception is more strictly applicable to things that exist, or that have existed, and which are known by our other original faculties. As far as things are the objects of knowledge to us, they become archetypes of our ideas or conceptions: such are *substances*, *modes*, and *relations*.

Obs. The word conception is sometimes used as synonymous with imagination: as when it is applied to the formation of new combinations and images; in doing which the mind assembles the qualities and circumstances of different objects, and forms new wholes of its own creation. This is the work of the poet and the orator. But even here we may notice this distinction; viz. that it is properly the office of *imagination* to form such combinations, and the business of *conception* to apprehend them when already formed. Of the correctness of this, the common phrase, "not in the power of *imagination* to *conceive*," is an illustration. On the same principle, when we say, "we conceive a centaur, a golden mountain," or other objects that have no real existence, conception in such cases denotes the effect of the power of imagination.

Q. What is another power of imagination, as distinct from conception?

A. "Another power of imagination is a lively conception of objects of sight." This faculty the mind exercises in connexion with intellect, in spreading around intellectual ideas a colouring and imagery drawn from the scenery of nature; as is the case in oratorical and poetical description. In like manner, the chief aim of figurative language is, to clothe abstract qualities and relations with sensible images, in order to produce an effect upon the imagination and passions, as well as upon the understandings, of others.

Q. How is conception further distinguished from imagination?

A. It is customary, in common speech, to apply the word conception to things which we believe or suppose to exist, and not to such as are fictions of imagination; and also to propositions and opinions which are deemed true or probable, and not to those which are considered incredible or fabulous. So also in common speech, the opposites, *real* and *imaginary*, *fact* and *fiction*, what we have *experienced*, and what we have only *imagined*, &c. distinguish pretty accurately the separate provinces of these two faculties.

Q. Can you enumerate the several classes of the objects of conception?

A. These are, 1. The absent objects of perception, including all external things, and their qualities.

2. Our past sensations, which are of various sorts, both bodily and mental.

3. The objects of our consciousness and reflection.

4. Objects of memory, as facts and events.

5. Relations, which are discerned by judgment and the moral sense.

As all these are the objects of the understanding, when we think upon them; so we are able to conceive them clearly and distinctly in proportion to our knowledge of their natures and properties.

Q. What is the difference between *actual* and *relative* conception?

A. If we know any one quality or property of a thing, we can form some actual conception of it; if we are acquainted with several of its attributes, our conception of it will be more distinct and adequate. In either case it is actual conception. But of things that are wholly unknown to us, and whose existence simply, is inferred from their relation to things that are known, we can have only a relative conception. Such are our conceptions of the essences of bodies, of efficient causes, and of many other things, of which we know nothing but their existence.

Q What is analogical conception?

A. It is analogical conception when it is formed, not from any actual knowledge of the things themselves, but from their supposed resemblance or analogy to things which we do know; such are our conceptions of the objects learned from revelation; as angels, the world to come, &c.; or from human testimony, as distant places and objects which we never witnessed. In all cases our conception is analogical, where the objects conceived have not fallen under our own immediate knowledge or observation; for we have no other means of representing such objects to our minds, than by clothing them with attributes and appearances borrowed from other known objects deemed analogous to them.

Q. What is meant by a comprehensive conception of a thing?

A. It is such a conception of it as comprehends all its leading properties and relations. "If," says Dr. Reid, "we consider the conception we form of any individual person of our acquaintance, we shall find it to be made up of various attributes, which we ascribe to him; such as that he is tall or short, well or ill formed, comely or ill-favoured, young or old: to this we may add his temper, his character, and his abilities; besides other relative attributes, as that he is the son of such a man, the brother of such another, that he has such an employment or office, has such a fortune, that he is married, or unmarried, and the like:" all of which, viewed simultaneously by the mind, is a comprehensive conception.

What is the office of memory, in connexion with conception?

A. This may be shown by an illustration. Thus: "when a painter makes a picture of a friend who is absent or dead, he is commonly said to paint from memory; the power of *conception* enables him to make the features of his friend an object of thought, so as to copy the resemblance; the power of *memory* recognises these features as a former object of perception." If the object of our conception be an event, memory refers it back to a particular point of time, but bare conception implies no idea of time whatever.—*Stew. Elm. chap.* 3.

SECTION TENTH.

SIMPLE IDEAS OF SENSATION AND REFLECTION.

Q. What are simple ideas of Sensation?

A. *They are the notions which we form of the simple qualities and properties of material substances, which have been objects of perception by our several senses.* Such are our ideas of colours, tastes, sounds, smells, of heat and cold, a point, a surface, and other tangible qualities, considered separately, as simple objects of thought. See Analysis, Sec. 5.

Q. What is the particular office of the several senses in giving us the knowledge of the qualities of bodies?

A. Light and colours are perceived by means of the eye, sounds by the ear, tastes by the palate, smells by the nose, and heat and cold, roughness and smoothness, hardness and softness, by the touch. Extension, figure, rest, and motion, are perceived both by seeing and feeling. It is by the power of abstraction that these objects of sense are analyzed into their simple elements, which furnish the mind with simple ideas.—*See Abstraction, Sec.* 6.

Q. What are simple ideas of *reflection?*

A. They are ideas of the simple operations, affections, and purposes of the mind: as perception, consciousness, willing, loving, fearing, hoping, resolving, &c. Also such are ideas of time, number, &c. as well as many of our ideas of relations, which are objects of intellect and of moral perception, and are the result of comparison and judgment.

Says Dr. Reid, " we must first perceive relations by our judgment, before we can conceive them without judging of them, as we must first perceive colours by sight, before we can conceive them without seeing them."—*Essay* 5, *chap.* 1.

Q. In what way alone can our first notices of the qualities of outward objects be acquired by the mind?

A. They can be acquired only through the proper inlets, the senses; insomuch, that if we are destitute of either of the senses, all the ideas thence arising are lost to us beyond a remedy. Thus the blind have no ideas of colours, nor the deaf of sounds.

Q. What inference follows from this general fact ?

A. Hence it appears that all our simple ideas of bodily qualities, are just such as nature furnishes them, and have no dependence on our will : we can neither destroy them when in the understanding, nor fashion, nor invent any new one, not taken in by the ordinary means of apprehension.

Q. What is the second inference from the same fact ?

A. It is this : that the utmost extent of human conception cannot exceed the bounds of our simple ideas, and their various combinations. " It is not in the power of fancy to bring any one simple ingredient into its productions, which nature has not framed, and brought to our knowledge by some other faculty."—*Reid.*

We can only modify and compound the materials furnished us by nature, and beyond this we cannot produce one additional idea.

Q. How does the mind make these original materials sufficient for all the purposes of its discoveries and communications ?

A. By compounding and combining its simple notions in various ways. By this means it finds itself possessed of resources of thought sufficient to employ all its powers, and to enable it to make endless advances in knowledge.

Q. How is this truth exemplified by the consideration of number ?

A. We may fix on the single idea of unit, or one, and observe what a variety of combinations are formed by continually adding it to itself, and to what an extent this process may be repeated. And if we suppose a like process of composition to be possible in combining our other simple ideas, we shall be far from concluding that the exersise of the human faculties is confined or limited for want of sufficient materials both for conceiving and exhibiting to others, the several objects and combinations that come within the compass of thought and inquiry.

SECTION ELEVENTH.

COMPLEX IDEAS.

Q. What are Complex Ideas?

A. *They are ideas of complex objects, as of a house, a tree, a triangle; and of virtue, science, patriotism, &c.*

Q. What is the first general division of complex ideas?

A. Into those of real existence, and those framed by the mind.

Ex. Of the first class are our ideas of the real objects of nature, that are exhibited to our perception as complex individuals. Such are all ideas of substances.

Note. The formation of complex ideas is to be referred to the faculty of combination.—*See Sec.* 8. In like manner, simple ideas are the result of analyzing, and relative ideas of comparing.

Q. What are complex ideas of *SUBSTANCES?*

A. They are ideas of such combinations of properties as are found to co-exist in the same subject. Our ideas of bodies are combinations made up of those simple parts into which they may be resolved; since body, so far as it is known and conceived by us, is only a collection of properties held together by some unknown principle of support.

Q. How is this further illustrated?

A. Thus, a particular taste, smell, colour, degree of hardness, and coherence, being observed to accompany each other in the same tangible object, the aggregate is called an apple; another group of sensible objects is called an orange; another wood, iron, stone, &c. All such aggregates of objects, concomitantly perceived by the senses, have distinct names, and are conceived by the mind as complex individuals.

Q. What may be remarked respecting our first notions of bodies?

A. Our first notions of them, gained by the senses, are of assemblages of different qualities, confused and obscure; but by attentive examination of them by the senses, we learn their leading properties and characteristic differences, so that they may afterwards be easily analyzed and combined by the mind, as the purposes of reasoning and communication may require.

Corol. The foundation of all distinct and adequate ideas of bodies is laid in a previous knowledge of their several properties gained by the senses. The same is true of all our other complex ideas of mixed modes and relations; the ingredients that compose them must first be known by our other faculties, before they can be united together in our conception. Hence arises the difficulty of having distinct and adequate ideas of things, which, however, are essential to correct reasoning and knowledge.

Q. What is meant by an adequate idea of a thing?

A. An idea or conception is called adequate, when it includes the several constituent properties and powers of the subject so far as they are generally known. So an adequate idea *of gold* includes in it a body of yellow colour, of superior weight, ductility, fusibility, of solubility in aqua regia, and other properties known to the chemist and the goldsmith. He that includes but a few of the known properties in his idea of a thing, may have a distinct and precise idea, but not an adequate idea of that thing.

Obs. Real ideas are such as have real objects in nature, which did, or do, or may, actually exist, and of which the ideas are correct transcripts or copies. These are precisely the ideas that pertain to logic. Imaginary or fantastical ideas, are ideas of imaginary beings as a centaur, a fairy, a sylph, a satyr.

Q. What are complex ideas of *MODES?*

They are ideas of certain combinations of attributes variously put together, according as convenience, utility, or fancy may dictate. Such are our ideas of hours, miles, hundreds, beauty, knowledge, treason, murder, a tune, a triumph, &c.

Q. These combinations are of two kinds, what are they?

A. Sometimes the mind proceeds, by adding the same idea to itself continually. Thus by adding units together in distinct collections, we come by the several combinations of numbers, as a dozen, a score, a thousand. At other times we unite conceptions of different kinds, in which case the composition is more manifest. Harmony, for instance, is a compound of many different sounds united; all which must be conceived and put together in the mind of the musician, before the actual performance can delight the ear.

Q. What is there remarkable in our complex ideas of numbers?

A. They are of all others the most distinct and accurate, when once they become familiar to the mind.

Q. How is this fact accounted for?

A. Our simple ideas of units are very clear and definite; and since by adding these together in distinct collections, and by repeating the same combinations we ascend to the highest denominations of numbers; this whole process and the successive combinations thus formed may be clearly comprehended by the mind.

2. The names of numbers also are so artfully contrived, being made to grow out of one another, and by their very structure to distinguish precisely the stage of the progression in each successive combination, that they very much aid us to a ready and distinct conception of the several aggregates which they denote.

Q. What is requisite in order to a ready comprehension of a very compounded number, as a million?

A. It is necessary that the mind should be able to retrace the several steps of the progression at a glance, and to have a view of all the parts intervening between that denomination and simple units; and this it is able to do by reason of the orderly method of combination, and by means of this artful structure of the names already mentioned. Hence the most bulky collections of numbers are easily and distinctly comprehended, since, from the highest combinations, the mind can run back through the whole series, till it arrives at unity itself.

Q. How is the consideration of number of great use in ascertaining our conceptions of space and duration?

A. All our distinct notions of time and space are gained by the application of number Thus by fixing upon certain stated measures, as an hour, a yard, which are clearly comprehended; and by continually repeating these and the like measures by the aid of numbers, the mind is able to form accurate conceptions of the largest portions of time and distance, without confusion or perplexity; whereas, without such helps, time and space would degenerate into confused and irregular masses, of which we could neither conceive distinctly, nor speak intelligibly.

Obs. The knowledge of numbers, next to the use of the alphabet, may be considered the greatest and most useful of human inventions. Indeed, the words expressing numbers are so indispensable to a compendious and precise communication of our thoughts, that without them language would be entirely lame and inadequate to the purposes of life.

Q. What may be observed respecting *mixed modes*, as distinguished from those *simple modes* of number, time, and space already described.

A. Although *mixed modes* are combinations of ideas of different kinds, which have no real union in nature, as substances have, but are entirely the workmanship of the mind; yet nature, for the most part, points out those simple ideas which are most proper to be united in a complex one. Thus many complex operations of nature and of art, as a tempest, a procession, &c. and many traits of character, and combinations of bodily and mental exertion in men, as magnanimity, heroism, horsemanship, and the like, are conjoined in fact and experience, and suggest to the mind *complex* ideas. Such assemblages of qualities and actions concomitantly perceived, are naturally and conveniently united in one combination, and expressed by one word.

Q. How are other combinations suggested?

A. Other combinations are suggested both by the relations between the simple ideas that compose them, and by their fitness to aid our own conceptions, and to enable us easily and compendiously to convey them to others by language.

The fact that the combinations which have names, are nearly the same in the different languages of civilized nations, so that in translating we can for the most part give words in one language answering to those of another, proves that these combinations are not formed arbitrarily, but are suggested by some common natural principle.

Q. To what combinations are men most naturally directed?

A. They are first led to form such as are necessary to express their wants and desires, and to answer the exigences of society and of mutual intercourse. These and the like considerations of utility and convenience dispose men, out of an infinite number that might be formed, to form certain combinations rather than others. As new complex notions, with their names, are multiplied, the language of any nation becomes more copious, and this usually keeps pace with their improvements in the arts, and their advances in refinement and civilization.—See this subject treated at large, *Reid, Essay* 5, *chap*. 4, and *Locke's Essays, Book* 2, *chap*. 22.

Q. What particular occurrences give rise to new complex notions?

A. The several new discoveries and inventions, the improvements in arts and sciences, the various professions and pursuits of men, each give birth to many complex notions, which require particular names to be given them to render the combinations fixed and permanent.

Obs. As mixed modes are assemblages of many simple ingredients which have no real union in things themselves, it is the name chiefly that binds the several collections together; and such complex notions, when once fixed by settled names, can be preserved distinct and entire only by accurate definitions, and by keeping as much as possible the same precise signification to language. Still, since words are undergoing frequent changes in their meaning; and old combinations, with their names, are disappearing, and new ones are forming; language is never stationary, but is in a continual flux.

Q. Why do the several classes of human actions give rise to many complex notions?

A. It is because human actions occur most frequently, and immediately affect the welfare of society; hence they have been very nicely modified and distinguised into classes, and certain degrees of praise or blame have been assigned them according to their supposed deserts. Of this nature are those combinations of actions and intentions denoted by all moral words; such also are the objects specified and defined in criminal law, which, together constitute a large proportion of our complex ideas. "I apprehend," (says Dr. Reid) "it is utility that has led men to form only certain combinations, and to give names to them in language, while they neglect an infinite number that might be formed."

Q. What do you observe respecting the terms belonging to the several arts and sciences?

A. These terms, and the complex notions for which they stand, are the work of those particular nations among whom such arts and sciences have flourished.

Thus, most of the terms belonging to rhetoric, poetry, philosophy, and physic, and other technical words, come originally from the Greek language; the terms pertaining to the military art are mostly from the Roman; while in modern times many have been borrowed from the French. It is from the language of the Italians, who have excelled in the fine arts, that most of the terms used in architecture, painting, music, and sculpture are taken. As such terms, and the complex notions they denote, are never formed until there is use for them; so where the words do exist in the language of any nation, they prove that the things which they signify were known and practised by that nation. On the contrary, where the names do not exist, there the things themselves are unknown.

Q. What is the nature of *RELATIVE MODES?*

A. *They are combinations made up of several modes and relations united.* Such are the notions of sovereignty, subjection, duty, obligation, property, theft, rebellion, and the like; which words imply certain attributes of mind, and certain relations subsisting between the parties, to which they have a mutual reference.

Q. What directs mankind to the choice of certain combinations of this kind to the omission of others?

A. Here also, as in mixed modes, such combinations are formed as appear to be the most important and useful in answering the purposes of life. Of this nature are the relations subsisting between the Creator and creatures, ruler and subject, parents and children, cause and effect; and these give birth to numerous complex notions with their appropriate terms.

Q. Why are relations a very important class of our conceptions?

A. Because from these result most of our discoveries of truth and duty. Our inquiries chiefly regard relative ideas, since they are instituted for the purpose of ascertaining the relations that things bear one to another.

Ex. Thus, to ascertain the relative properties of magnitude to each other, is the aim of mathematics. The relation of cause and effect, and of effects to one another, forms the subject of philosophy. From our relation to our Creator and to each other. arise all the duties of religion and morality; and the relation which we sustain to the objects of nature around us, is necessary to be known, to enable us to judge of what will procure us either happiness or misery.

Q. What other class of relations may be noticed as giving rise to many complex notions?

A. It is the relation of human actions to their consequences. The tendency and consequences of actions give them their chief importance, and constitute their principal merit or demerit. Hence a multitude of words are employed to express complex relations of this sort; such as, just, unjust, proper, prudent, wise, foolish, good, bad; as also fitness, honesty, discretion, foresight, deception, &c.

Q. Are our relative ideas very numerous?

A. They form the most numerous class of our ideas, since every object we contemplate stands related to others in various ways; so also, the terms expressing the several simple and complex relations which are objects of thought, constitute a large proportion of the words in the language.

Obs. These relative modes are assemblages that represent *positive existences.* Thus the very essence of *holiness* consists in the conformity of our actions to the law of God. The nature of *sincerity* is the conformity of our words and actions to our thoughts. And the essence of *sin* is the voluntary transgression of the law of God; which assemblages are positive existences, and not mere privations.—*Watts' Logic, Part* 1, *Chap.* 2, *Sec.* 6.

Q. In addition to what has been said of the combinations that have already been formed by mankind, there are three methods by which we gain our complex ideas; or the notions annexed to the various words in the language, what are these?

A. 1. By our own experience and observation of the things themselves. In all such cases we get the ideas of things first, and then learn the names by which they are expressed.

2. By definitions, which unfold the meaning of words of a complex signification, and thus lead us to a knowledge of things.

3. By a sort of induction, collecting the several parts of the complex idea from the words as they occur to us in books or discourse, noticing their application, and thus gathering at different times their complete signification.

Q. Does a mere acquaintance with words, then, assist us to the knowledge of things?*

A. Doubtless it does, since the acquisition of the names prompts us to investigate the things which they signify. Also, by attending to words correctly employed by others, the ideas for which they stand are gradually collected and associated with the names.

Q. Of what use is an acquaintance with the derivation and composition of words in aiding distinct conception?

A. It is of the most important use in regard to most combinations of ideas; and is the only expedient for acquiring that nice conception, and accurate discernment of the meaning of language, which are necessary for philosophical purposes.

This *special* advantage results from the study of the learned languages; since a knowledge of the structure and derivation of words thence obtained, suggests to the mind those very occasions and conjunctures which first gave rise to the combinations for which they stand; and answers much the same purpose in aiding distinct and accurate conception of mixed modes, as actual perception does in respect to objects of sense.

Q. Why are clear and determinate ideas essential to correct judgment and reasoning?

A. Because unless our ideas of things be clear and distinct, we cannot trace their agreement or disagreement, in which judging and reasoning consists. He that has not clear and determinate ideas, cannot form propositions of them, of the truth of which he can be certain. Hence it follows, that clear and distinct conceptions of things are the only fit materials of reasoning.—*Locke, vol.* 2. *p.* 218. *Reid, vol.* 3. *p.* 85.

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* In cultivated society, one of the first acquisitions that children make, is the use of language, by which means they are familiarized from their earliest years with classes of objects and general truths; and before that time of life at which the savage is possessed of the knowledge necessary for his own preservation, are enabled to appropriate to themselves the accumulated discoveries of ages.—*Stewart's Elem. chap.* 4. *sec.* 5.

CHAPTER II.

OF TERMS AND DEFINITIONS.

SECTION FIRST.

OF WORDS AND THEIR USES.

Q. What are words?

A. Words *are signs of things*, and the vehicles of thought; used by common consent of all who speak the same language, to denote the particular objects to which they are applied.

Obs. To say with Mr. Locke and others, that "words are signs of the ideas in our own minds and in the minds of others," favours these erroneous suppositions; that *ideas*, and not *things*, are the objects about which our thoughts are employed; and that all our knowledge is about our ideas, and not about things themselves.

"The truth is, that words signify *things*, that is, as many properties as are known to the speaker to appertain to any thing."—*Kirwan, Logic, No.* 15.

The primary end of words, is to mark the things signified, and so far as words denote individuals, they recall ideas, by previously referring the mind to things; but as most words have a general meaning, the sense of these, when become familiar, is more readily recalled by memory and association, without a reference to things.

Q. Are words natural or arbitrary signs of the things they denote?

A. Words are for the most part, arbitrary in their application, in as much as "they possess no natural aptness to denote the particular things for which they are used, rather than others: but acquire this aptness solely by custom and use."—*Hedge.* So, antecedently to convention and use, there was as much propriety in giving the name wood to *iron*, and the name black to *white*, as in giving them the names that have been assigned them. But after the connexion between the name and the thing has been established by custom and general consent; to say "that any man may, if he please, give the name *square* to a *circle*, &c. provided he apprises us of his real meaning, and that no one has a right to contest this liberty with him," is to encourage trifling in the highest degree.

Q. When, and not before, may words be made the instruments for communicating ideas to others?

A. No ideas can be communicated to another by language, until the materials of which they are composed, have been suggested to him by his conversing with the proper objects; for previous to this, words are empty sounds, and fail to excite any conception in his mind.

Inf. Hence simple ideas, or ideas of the simple qualities of things, cannot be originally conveyed to any one by language; he can obtain them only by information of the senses, and by his own reflection.

Q. Whence is it that complex notions may easily be conveyed to others by language?

A. Simple ideas find admission into the minds of all men by the ordinary avenues, and are alike in the experience of all; whence mankind agree in giving them the same names: as black, white, sweet, sour, &c. Hence we may easily make complex ideas intelligible to others, by employing the words which express the several simple ideas that are concerned in the composition of them.

Q. How is this illustrated?

A. Thus the idea answering to the word *rainbow*. may be readily excited in the conception of another who has never seen the object itself, by barely describing its figure, position, and the order of the seven primary colours that compose it; provided that these several simple ideas and their names are already known to him.

Q. What general distinction obtains between our simple and complex ideas?

A. Complex ideas and objects are definable, or explicable by description; but simple ideas cannot be defined; as power, existence, action, &c.

Q. Why do not simple ideas admit of definition?

A. Because they being transcripts of simple objects, which cannot be resolved into parts; there can be no enumeration of parts, in order to make up a definition. The attempts of Aristotle and of the schoolmen, to define simple ideas, are sufficiently ludicrous.

Obs. "Yet ideas of the simple qualities of bodies may be recalled to the mind, by a reference to the subjects in which such qualities reside. Thus, white is the colour of snow, yellow is the colour of gold or saffron."

In like manner simple ideas of the mental states, may be excited in the minds of others, by describing the occasions on which they are produced: as, "surprise is the passion, or state of mind, produced by the perception of some new or uncommon object."—*Hedge, Logic, No.* 40.

SECTION SECOND.

LOGICAL DISTINCTIONS OF TERMS.

Dist. 1. Q. What are the distinctions of terms *simple and complex?*

A. A simple term, is a single word, as man, horse, river.

A complex term, consists of two or more words connected in sense, formed to be the subject or predicate of a proposition; as human life, man's happiness, a good education.

Dis. 2. Q. How are *absolute* and *relative* terms distinguished?

A. An absolute term, expresses a thing or quality, without intimating its relation to any other thing; as triangle, tree, knowledge, height. "A relative term denotes an object so far only as it is connected with some other object:" Thus, *father* implies a man so far as he is the cause of existence to another, denominated in reference to him, *son.*

Q. What are correlative terms?

A. "These two terms, *father* and *son*, intimating each other by a reciprocal reference, are called *correlative.*" So also, master and servant, husband and wife, ruler and subject, and the like, are correlatives.

Dis. 3. How are *univocal* and *equivocal* terms distinguished?

A. Univocal terms preserve invariably the same signification. Thus, book, distance, strength, equality, always signify the same things. *Equivocal* words are such as signify two or more different things. Thus, head may signify a part of an animal, of a nail, and of a discourse. Post is either a piece of timber. or a swift messenger.

Dis. 4. Q. What are *synonymous* and *convertible* terms ?

A. When two or more words are applicable to the same thing, or have the same signification, they are called *synonymous terms*, as wave and billow, feather and plume. *Convertible terms*, are such as may be substituted the one for the other, by reason of their reciprocal meaning: as, globe is a round ball, and a round ball is a globe. Twenty is a score, and a score is twenty.

Dis. 5. Q. How are *abstract* and *concrete* terms distinguished ?

A. Abstract terms " signify some quality or attribute without referring to any subject in which it may be found," as whiteness, roundness, length, equality, wisdom, mortality, humanity.

Concrete terms express or imply both the attributes and the subjects to which they belong. So, *white, wise, mortal*, are concretes, and refer to some subjects of inhesion. Thus also, philosopher, statesman, poet, fool, knave, besides signifying directly these distinguishing characteristics, denote persons also, the subjects of them.

Dis. 6. Q. What is the distinction of terms, into *singular* and *universal ?*

A. A singular term is the name of some individual person, place, or thing; as Cæsar, London, Nile.

Universal terms, otherwise styled common names or appellatives, are names applicable to whole classes of individual beings. Thus, man, tree, river, are universal terms, because they agree to all men, trees, and rivers.—*Hedge No.* 32.

SECTION THIRD.

OF GENERA AND SPECIES.

Q. What is meant by the genera and species of things ?

A. The distribution of all the productions of nature and art into classes, each class including all such individuals as agree in some common properties, forms what logicians call the *genera* and *species* of things.

Q. What is a species?

A. Species denotes a class including only individuals, resembling each other in their essential modes and properties.

Q. What is a genus?

A. Genus denotes a more extensive class, including under it two or more species.

Q. How is a species formed?

A. A species is formed by comprehending in one class such an indefinite number of individuals as are found to possess certain common properties, which distinguish them from others, and entitle them to the same general name. Thus the name man, denotes a species consisting of an indefinite number of individuals, and is applicable to them all, "on account of their agreeing in the essential properties of an erect figure, and the faculties of speech and reason." The word *tree* also denotes a species, and is applicable to a multitude of individual objects, which resemble one another, in trunk, branches, and shape. So also, horse, sheep, eagle, sparrow, are species, they being classes composed of *individuals* possessing the same common natures and properties.

Q. How is a genus formed?

A. By uniting in one more general class several species, on account of their possessing some common properties of resemblance.

When among several species we find certain properties in which they all agree, by rejecting those particulars in which they differ from each other, and retaining only such as are common to them all; we make such common properties the foundation of the genus.

Ex. Thus the several species of the feathered tribe, as sparrow, dove, hawk, eagle, all resemble each other in being covered with feathers and provided with wings; on account of which resemblances, we rank them all under one general class or *genus*, and give it the name *bird*.

Q. How are the more general classes formed?

A. In like manner as before. Thus, *bird* is a genus comprehending the several species of sparrow, duck, eagle, &c.; *fish* is a genus including under it the several species inhabiting the waters; *beast*, *insect*, *reptile*, is each a genus which extends to many species: yet all these different genera* possess this in common, that they are provided with organical bodies, fitted for the purposes of life, sense, and spontaneous motion. A term, therefore, comprehending all the genera above mentioned in one more general class, is *animal;* which includes the several creatures endued with life, sense, and spontaneous motion.

Q. How does the gradation still proceed?

A. All things animate and inanimate resemble each other in this respect, that they are created; whence we refer them to a genus still higher, which we denominate *creature.* And further, all things whatever, exist or have a being, and in this respect are said to resemble each other; for which reason we refer them to a genus still higher, called *being*, which is the highest possible genus.

Obs. The other extreme of the series, viz. the lowest class, which is composed only of individuals, is called the *lowest species.*

Q. How are the several intermediate classes considered, in regard to those above and below them?

A. All the intermediate classes between the highest genus and the lowest species, are termed *subaltern;* each becoming in its turn either a genus or a species, according as it is considered in the ascending or descending series.

Ex. Thus, *bird* is a genus when referred to eagle, hawk, duck, sparrow; but is a species when referred to the more general class, *animal.*

Q. What is meant by the *comprehension* and *extension* of general terms?

A. "By the *comprehension of a term* is meant, the aggregate of all the known properties of that thing or class of things to which it is applied. Thus, gold includes in its comprehension a material substance, a yellow colour, superior weight, ductility, fusibility, and all other known properties of that body."

"The *extension* of a term regards the number of individual subjects to which it may be applied. So the term gold includes in its extension, every separate parcel of that metal. Man, includes in its extension, every individual of the human race."—*Hedge*, *No.* 35.

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* Genera, in Latin, is the plural of genus; genus signifies a *kind*, and species a *sort.*

Q. What general fact holds true of the several classes?

A. It is this, that the higher the genus, and the more general the term that expresses it, the fewer properties or simple ideas are included in its signification. Thus the highest genus of all, denoted by the word being, includes only the single idea of existence. The term creature, of the next inferior grade, comprehends more properties, as it denotes a *created being*, but is applicable to a less extensive class. So the term animal, implies a still greater collection of properties than creature, but a smaller class of subjects.

Hence it is an axiom in logic, *that the more extensive any general term is, it is the less comprehensive;* and on the contrary, *the more comprehensive, the less extensive*

Ex. Thus the comprehension of the species *dove*, is obviously greater than that of the proximate genus *bird*; for dove includes all the attributes of bird, and its own peculiar attributes in addition. So the comprehension of the term bird, is greater than that of animal, to which it is subordinate; but on the contrary, animal embraces a more extensive class than bird, and bird a more extensive class than dove.

Q. What is meant by the specific difference?

A. The specific difference is the property or collection of properties, by which any species is distinguished from every other species of the same genus. So juice is the nearest, or proximate genus of wine, but its *pressure from grapes is the specific difference*, which distinguishes wine from the several species of juices, such as cider, perry, shrub. &c.

Obs. In the formation of the several classes from the lowest species to the highest genus, it is obvious, that at each remove, those distinguishing properties, which form the specific differences are discarded, leaving the next superior classes severally of less comprehension, but of a greater extension.

SECTION FOURTH.

OF DEFINITION.

Q. What are the distinctions of definitions ?

A. Definitions are usually distinguished into two kinds, one of the *name*, and the other of the *thing*.

Q. What is the definition of the *name* ?

A. 1. Defining the name is merely specifying the object for which the name stands, which is sometimes done by indicating its use ; as when we say, a clock is an instrument by which we measure time ; an umbrella is an instrument used for keeping off the sun or rain. In this manner, the names of simple ideas may be defined, as, white is the colour of snow or milk—or,

2. Definition of the name is a bare explanation of a term by other synonymous words, without teaching the nature or physical constitution of a thing ; as a plume is a feather, procerity is tallness, palace is a king's dwelling.

Q. When is a definition merely nominal, or of the name ?

A. When its aim is merely to remind us of some known object, or to teach us by what name a thing is called, without unfolding its nature. Such are most of the definitions of lexicographers.

Q. What is meant by real definition, or definition of the *thing* ?

A. A definition of the thing is an enumeration of its essential and distinguishing properties. Thus, a *square* is a figure bounded by four equal sides joined together at right angles. *Animal* is a creature possessed of life, sense, and spontaneous motion. Or thus—*gunpowder* is a composition, consisting of sulphur, saltpetre, and charcoal.

Q. What is the design of definition ?

A. It is to unfold our complex ideas of things ; it being supposed that the simple ideas of which they are composed, and their names are previously known.

Q. What are the two requisites of a just and adequate definition ?

A. First, that the several simple parts of the complex idea be enumerated ; Secondly, that the order and manner in which the simple parts enter into the combination be explained. Thus, in defining *rainbow*, it is not sufficient to enumerate the several simple colours that compose it, but also to explain the order and manner in which they are united in the formation of the whole figure. With these two requisites, a definition may readily convey to another an idea of any new complex object, provided he understands the meaning of the terms employed.

Q. Of what importance are definitions in the sciences ?

A. Correct definitions are the foundation of all science. Here most of the ideas that occur are complex ; and these combinations require to be unfolded, and the terms to be defined, in order that others may be made acquainted with our discoveries.

Q. How may the names of simple ideas be considered in defining ?

A. These may be called the elementary parts of language. For, in unfolding any combination, the definition which enumerates its component parts, must consist of the words by which these parts are expressed ; which words may also denote compound ideas.

And if it so happen that the ideas of the second class last enumerated are also unknown, their terms too require to be still further defined. In this manner a series of definitions may be carried on till we descend to the names of simple ideas, which not being definable, the analysis necessarily ceases.

Q. Which is the best mode of unfolding very complicated ideas in definition.

A. In defining a very complicated idea, as that of thousand, for instance, the definition is more clear, by resolving it only into the next lesser combinations, if the terms made use of are understood. Thus, to say *a thousand is ten hundreds*, is perfectly plain to one who understands the meaning of hundreds ; but if otherwise, we must proceed by stating the number of tens that make a hundred ; and if the idea of ten is not familiar to him, as a last resort we mention the number of units that make up ten.* In like order, most other complicated notions are resolvable, by proceeding from the more complex to the more simple combinations, enumerating at each step the parts in the next inferior denominations, until, if occasion require, we descend to simple ideas and original notions.

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* Still, most complex ideas cannot be traced directly to simple ones by distinct gradations like those of numbers. It does not appear how they *rise just so many stories high* from elementary principles, as some writers would intimate ; but they are often of very irregular formation. In many cases it is not easy to determine the classes that are co-ordinate, nor those which are next subordinate to a superior combination, in order to exact method in definition.

Obs. " Real definition includes the nominal, for an explanation of the nature of any thing, necessarily fixes the signification of the name by which it is called."—*Hedge.*

Q. What is the standard, in reference to which definitions may be called just and adequate ?

A. In defining substances, such an enumeration of their most essential modes and properties is requisite, as will lead us to a knowledge of their natures. In defining other combinations of mixed modes and relations, which are collections of a variable number of simple parts held together chiefly by the name, custom and the best usage is the standard. " In unfolding the meaning of the words in definition, we ought to enumerate such simple parts of the idea as are affixed to the words by those who best understand the language."—*Reid, Ess.* 4. *Chap.* 5.

" Some persons put more, and some fewer ideas into the meaning of words. Hence a multitude of disputes arise, which are merely verbal, from a misapprehension of the complete meaning of words."—*Watts' Logic.*

Q. What is the ground of this common misapprehension ?

A. " The complex ideas denoted by most general words, are for the most part not learned at once, like those of mathematical terms, by an accurate definition ; but from the experience we happen to have by hearing the terms used in conversation, or by meeting with them in books, and thence collecting their signification. But as this sort of induction is for the most part lame and imperfect, it happens that different persons join different conceptions to the same general word."—*Reid, Ess.* 4. *chap.* 1.

Q. What is the only remedy for this defect ?

A. A patient and critical attention to the meaning of words in their various acceptations, and also a habit of analyzing with accuracy the complex ideas we annex to terms. " This is a study which every individual must carry on for himself, and of which no rules of logic" nor force of genius " can supersede the necessity."—*Stewart's Elem. chap.* 2. *sec.* 2.

Q. What are the *special rules of a good definition?*

A. 1. A definition should be of equal extent with the subject defined, so as to suit all the particular species or individuals included under the same general term.

2. It should be peculiar to the thing defined, so that it may distinguish it from all others; with these two requisites a definition will be reciprocal with the thing defined, and may be substituted in its place.

3. It should be not only clear, but also as short as the nature of the subject will permit, having no tautology in it, nor any superfluous words.

4. Neither the thing defined, nor a mere synonymous word should make any part of the definition, for neither would be any explication of the nature of the thing.—*Watts' Logic, Part* 1. *Chap.* 6. *Sec.* 6.

SECTION FIFTH.

DEFINITION ACCORDING TO GENERA AND SPECIES.

Q. According to the distribution of things into genera and species, logicians have established a certain compendious mode of definition, which is preferable in all cases wherever it is practicable: how does this method proceed?

A. If the thing to be defined be in any degree general; that is, if it be any class above the lowest species, the definition is made up of the nearest *genus* and the *specific difference.* Thus, a square, a circle, a triangle, are *species* of the same genus, *figure:* hence by adding to the genus the several specific differences, we frame the logical definitions. As, a square is a *figure which has four equal sides and four right angles.* A circle is a *figure whose circumference is in every part equally distant from the centre.* A triangle is a *figure bounded by three sides.* Figure is the nearest genus, the other terms make the specific difference.

Q. What are the peculiar advantages of this mode of definition?

A. Those of brevity and precision. Instead of attempting to enumerate the several simple ingredients that compose most complex objects, to do which would be impossible, and the number of which would confound the understanding: the genus and difference expressed by their proper terms make up a complete definition.

Obs. Many things do not fall under any particular genus, of others the specific differences are not known; in either case, they cannot be defined after this manner: also, some words are of too complex a meaning to admit of logical definition.

Q. How are specific differences often expressed?

A. By single adjectives, which are employed to distinguish the different species belonging to the same genus; especially in the definition of substances. The following are examples; *oak* tree, *beach* tree, *cherry* tree. Or thus, Indian is a *red* man, negro is a *black* man. Here, although the words red and black, &c. do not so properly denote different *species*, yet they serve the purposes of distinguishing the different classes defined.

Q. What is one leading principle in the formation of classes by which definition ought to be regulated?

A. It is, that in each remove from the lowest species to the highest genus, the several collections of properties that form the specific differences are discarded. Hence the same principle is to be regarded in definitions, only in the inverted order. Accordingly, by commencing with the highest genus, and carrying on the series of definitions through all the intermediate classes quite down to individuals, and by superadding at each step the specific difference to the nearest genus; we restore the several combinations, or unite the precise collections of properties that belong to each class under their appropriate terms. In this manner, as the name of each genus is defined before it is admitted into the definition of the subordinate class; so enumerating the specific differences in connexion with it, fixes the signification of the terms that make up the other part of the several definitions.

Q. How may this be exemplified?

A. Thus, in defining these subordinate terms, *horse*, *quadruped*, *animal*, *creature*; we say, creature is a *being that is created;* animal is a *creature possessing life*, *sense*, *and motion;* quadruped is an *animal having four legs;* horse is a *quadruped of superior size*, *beauty*, *and speed.* Here the names of the successive classes are respectively defined, by enumerating the several collections of properties that make up the specific differences, in connexion with the generic terms already defined: the nominal definitions in the mean time coinciding and keeping pace with the real.

Q. How is the lowest species defined?

A. As the lowest species consists only of individuals, which having no *specific* differences, the definition will consist of the species, and either the individual, or numerical, or a circumstantial difference.

Ex. The sun is a vast globe, the source of light and heat.

January is the first month in the year.

Mercury is the planet nearest the sun.

Q. Why cannot individuals be defined?

A. They cannot be well defined, because either they possess no essential differences from others, or their differences are not generally known. Besides, the verbal enumeration of their distinguishing peculiarities necessarily takes the form of description, and will not admit of the structure of definition: "therefore individuals are only to be described by their particular circumstances."—*Watts' Logic, P.* 1. *Ch.* 6. *Sec.* 6.

SECTION SIXTH.

DIVISION AND DISTRIBUTION.

Q. What is division?

A. "*Division is the explication of any whole by the enumeration of its component parts.*" Thus, the year is divided into four seasons; a tree is divided into trunks, roots, and branches.

Q. What else does the term division denote?

A. It denotes the distinct component parts into which any whole is resolved. It is also applicable to the resolution of a treatise or discourse into its several heads, or of a book into chapters, or of a poem into books, cantos, &c.

Q. What are the *rules of a good division*, as usually given?

A. Rule 1. The members of a division should exhaust the subject; that is, all the parts, taken collectively, must contain no more nor less than the whole.

Rule 2. The several parts should be so opposed, that one will not be contained in another. In order to an exact division, therefore, we ought to have at once a comprehensive view of the whole subject.

Rule 3. The parts into which any thing is first divided should be the largest and most comprehensive. It would be improper to divide a kingdom first into towns and villages, but it must be divided first into provinces or counties, then these into their constituent parts.

Q. What is meant by *subdivision?*

A. The resolution of any more general division into others more minute, is called *subdivision.* Thus a circle is first divided into quarters, and these quarters are divided each into degrees, degrees into minutes, and minutes into seconds.

Q. How is the term distribution applied in distinction from division ?

A. The word *distribution* is most properly used when we distinguish a universal whole into its several kinds or species ; so we distribute animals into beasts, birds, fishes, and insects. Or when a complicated whole, which admits not of exact division, is resolved into parts more or less distinct, in order to their being separately considered ; it is properly called distribution. Again, when a collection of individuals are assorted or apportioned into separate parcels, this is *distribution;* as, "the hundred men are *distributed* into ten parts." "The types have been *distributed.*"

Q. What are the rules for distribution ?

A. The same order is to be observed in distribution as in division. A genus should not be at once divided into individuals, or even into the lowest species, if there be any superior species intermediate. It is irregular also to join any inferior species in the same rank or order with the superior ; as if we should distribute animals into beasts, eagles, sturgeons, &c. instead of *beast*, *bird*, *fish*, *insect.*—*Watts.*

Q. Why should numerous subdivisions without necessity be avoided ?

A. Because, such subdivisions overload the memory, and introduce confusion.

PART SECOND.

OF JUDGMENT AND PROPOSITIONS.

Among all the things, whether individuals or classes, of the properties and attributes of which we form conceptions, certain *relations* subsist, to discover which is the next step in the way to knowledge.

Of these relations some are immediately discoverable by the bare inspection of the objects compared, and others by means of intermediate ideas; some upon *certain* evidence, and others upon *probable*, *doubtful*, or *fallible*; hence different mental determinations are formed respecting their agreement, or disagreement, called *Judgment*; and these judgments of the mind, expressed in words, are termed propositions.

CHAPTER I.

PROPOSITIONS, OR THE VERBAL REPRESENTATIONS OF OUR JUDGMENTS.

SECTION FIRST.

OF AFFIRMATIVE, NEGATIVE, AND IDENTICAL PROPOSITIONS.

Q. What is a proposition?

A. *A proposition is a sentence expressing some judgment, perception, or state of the mind.* Thus, *that two and three are equal to five*, is a proposition expressing a judgment, as it implies a comparison of ideas. This proposition, *The* *sky is clear*, expresses a perception merely. *I think, I am sick, &c.* are only declarations of the state of one's mind, known by consciousness.—*Kirwan's Logic, No.* 241.

Q. What are the constituent parts of a proposition?

A. These are, the *subject*, the *predicate*, and the *copula*. The two first are called terms, because they are the extremes or *termini* of the propositions.

Q. How are the three parts distinguished?

A. The *subject* is that concerning which something is either affirmed or denied. The *predicate* is that which is affirmed or denied concerning the subject. The *copula* is that by which the other two parts are connected. As,

Sub.	*Cop.*	*Pred.*
Death	*is*	certain.
Man	*is not*	infallible.

Obs. The copula can always be expressed by some inflection of the verb *to be*, and is sometimes placed before the subject, as in cases of interrogatory and imperative propositions. Thus,

Does my father yet live? Be ye clothed.

Q. What is true of all propositions?

A. In all propositions the three constituent parts are contained.

Again, one part is often contained in another. In the following examples, the copula is contained in the predicate. *I sit. The sun shines*, which are resolved thus:

Sub.	*Cop.*	*Pred.*	*Sub.*	*Cop.*	*Pred.*
I	*am*	*sitting*,	*The sun*	*is*	*shining.*

So the copula sometimes includes the predicate, as,

Rome is, i. e. Rome is existent.

Troy is no more, i. e. Troy has no being.

Obs. In some languages a single word may contain a complete proposition. Thus,

Amo is the same as,

Ego sum amans, I am loving.

Ambulat is the same as,

Ille est ambulans, he is walking.

Q. Affirmative and Negative propositions, how do they differ?

A. In an affirmative proposition, the ideas of the subject and predicate are connected by the copula; as, *Man is mortal.*

In a negative proposition, the subject and predicate are disjoined by inserting some particle of negation with the copula, to destroy their connexion, as, *Man is not perfect.*

Q. In negative propositions does the negative particle belong to the subject, copula, or predicate ?

A. It is to be considered a part of the *copula*, which it affects. For as it is the office of the copula to connect the subject and predicate in affirmative propositions ; so the particle of negation is introduced for the purpose of destroying this connexion. Hence, if the negative particle be annexed to the subject or predicate, still its influence falls wholly on the copula, and makes the proposition signify just the contrary of what it would without it.

Q. Why is this distinction important in reasoning ?

A. Because the only sure criterion in forming opposite or contradictory propositions, is, by simply adding the negation to the affirmative proposition in connexion with the copula. In this case the latter will always precisely contradict what the former affirms. So these propositions, He *is* guilty, He *is not* guilty, are opposites or contraries.

Q. What may be further remarked respecting the negative particle ?

A. If it be considered a part of the subject or of the predicate, the proposition, in either case, becomes affirmative, and the particle no longer serves to affirm the disconnexion of the subject and predicate. Thus the proposition, *No man is immortal*, is equivalent to, *All men are mortal.* Or this, *Some men are* not *honest*, is equivalent to, *Some men are dishonest.*

" Such must be taken as affirmative propositions are to be taken."—*Kirwan's Logic*, *No.* 95.

Q. Why is it that a copula, the sign of agreement and connexion must make a part of a negative proposition, which expresses disagreement and disunion ?

A. Because it is the nature of all verbs to affirm, and not to deny ; and since the particle cannot deny of itself without a verb, we are obliged in all negative propositions and assertions, first to use the copula or sign of connexion, and then to destroy this connexion by the insertion of the negative particle as a part of the copula.

Q. What is an identical proposition?

A. It is one in which the subject and predicate express the same idea; as, *A rule is a rule. A good man is a good man.*

These have been justly called *trifling*, since they do not advance a step towards knowledge.

Q. But there are some propositions wherein the ideas are not the same, although the terms of the subject and predicate seem to be so; what may serve as examples?

A. Such as these,

Home is home; that is, home is an agreeable residence.

Boys will be boys; that is, we cannot expect boys to be men.

What I have written, I have written; that is, what I wrote I still approve, and will not alter it.

Many such apparently identical propositions possess a force and a point which rescue them from the appellation of trifling, and entitle them to the dignity of rhetorical figures.

SECTION II.

SIMPLE AND COMPLEX, PURE AND MODAL PROPOSITIONS.

Q. What is a simple proposition?

A. A simple proposition is that which has but one subject and one predicate, and thus it is distinguished from a compound proposition. *A purely simple proposition* is that whose subject and predicate are single terms; as,

Industry is commendable.
Life is short.
Virtue will be rewarded.

Q. What is a complex proposition?

A. A complex proposition has one or both of its terms complex; as,

Virtue is desirable for its own sake.
No man living is perfectly innocent.

Obs. A proposition is sometimes rendered complex by introducing a relative pronoun, as, *who*, *which*, *whose*, with other words that form an incidental proposition, explanatory of the subject or predicate of the principal. Thus,

Hannibal, who defeated the Romans, was the son of Hamilcar.
The poison, which caused his death, was kept in his ring.
He had a brother, whose name was Asdrubal.

Q. In what other way may any proposition become complex?

A. By having its subject or predicate restricted by annexing to it a word of limitation; as,

Few wars are justifiable.
Respect is due to *good* men.

Here the words few and good, restrain the latitude of the general terms wars and men to which they are prefixed.

Obs. These restrictive words are equivalent to incidental propositions, and may be resolved into such; thus,

The wars which are justifiable are few.
Men, who are good, are deserving of respect.

Obs. The incidental proposition is to be considered a part of the subject or predicate of the primary which it explains, and the whole is one complex proposition.

Q. What is the distinction between pure and modal propositions?

A. *When a proposition barely asserts the agreement of the subject with the predicate,* it is called a *pure proposition;* as,

Every true christian *is* an honest man.

But, when it includes also *the way and manner* in which the predicate is connected with the subject, it is called a *modal proposition;* as when we say, *It is necessary* that a true christian should be an honest man. Here the manner in which the subject and predicate are connected by the qualified copula *should be,* is what renders the proposition modal.

Q. How then may a modal proposition be distinguished?

A. The modal nature may be distinguished by the copula, which consists of the verb *to be*, modified by such auxiliary verbs as, *may*, *ought*, *must*, *should*, and the like, which imply possibility, obligation, or necessity. Thus,

It is necessary that a globe *should* be round,

or, which is the same,

A globe *must be* round.

Men of piety *ought* to be esteemed.
The vicious sometimes *may* be triumphant.

Obs. These auxiliaries *may*, *ought*, *can*, &c. although they express the modality of the proposition, by giving the modification to the copula; yet are themselves a part of the predicate, and the verb *to be* is the proper copula.—*Watts' Logic, part 2. chap. 2.*

SECTION THIRD.

UNIVERSAL AND PARTICULAR PROPOSITIONS.

Q. When is a proposition universal, and when particular?

A. A proposition is styled universal or particular, according as the *subject, which is a general term*, is taken in the whole or a part of its extension. This consideration in respect to the extent of the subject, is called the *quantity* of propositions.

Q. What is a universal proposition?

A. A universal proposition, is one *whose subject is a general term, used in the whole of its extension.* The words, *all*, *every*, *each*, *no*, *none*, and the like, are the signs of universality, and form the most obvious criterion by which to distinguish them; as,

All animals have a power of beginning motion.
Every creature had a beginning.

These are universal propositions, because each subject includes a whole class, to every individual of which the predicate is declared equally applicable.

Q. What is a particular proposition?

A. *A particular proposition is one, whose subject is a general term, but is taken only in a part of its extension.*

The mark of limitation which is prefixed to the general term implies, that the predicate is applicable only to a part of the individuals comprehended under a species, or to some one, or more, of the species belonging to any genus. The signs of particularity are *some*, *many*, *most*, *few*, and the like. As,

Some stones are heavier than iron.
Few men are truly wise.
Many persons die unlamented.
Most wars are murderous.

Obs. In these propositions which are *particular*, the several predicates agree with their subjects only in that limited extent to which they are restrained by the words of limitation; *some, few, many, most.*

Q. What is an indefinite proposition?

A. A proposition is called *indefinite*, when the sign of universality is not prefixed to a subject, which is in its own nature general; as,

Planets are ever changing their places.
Angels are glorious beings.

The indefinite article placed before the subject, is the mark of an indefinite proposition,—As,

A true christian is also a patriot,
A just sovereign regards the welfare of his subjects.

Obs. These *indefinite* propositions are also *universal*, their subjects being taken in their greatest extent. For, could not the same be affirmed of *all planets, all angels, every true christian* and *just sovereign*, the propositions would not be true, without some other qualifying words.

Q. By what sure criterion may *universal* propositions be distinguished from *particular?*

A. Where the predicate agrees to all the individuals comprehended under the notion of the subject, there the proposition is universal. Where it agrees only to some of the individuals, or to some of the species included under the general subject, there the proposition is particular; although the words of limitation, *some, many, most*, are omitted.

Q. What is meant by a *Singular Proposition?*

A. *A singular proposition is one whose subject is an individual.* Thus,

Sir Isaac Newton was the inventor of fluxions.
Christopher Columbus discovered America.

A proposition is rendered singular by having a definitive pronoun, or the definite article, placed before it; as,

This book contains useful truths.
The house is now finished.

Q. Why is a singular proposition classed with universals?

A. Because its subject, as it represents only an individual, is necessarily taken in its whole extension, and thus it agrees with the definition of a universal.

Q. What is the most general division of propositions?

A. Into *universal affirmative*, and *universal negative*, *particular affirmative*, and *particular negative*. This fourfold division comprehends all their varieties.

Q. What is meant by the quantity and quality of propositions?

A. The distinction of propositions into universal, or particular, is called their *quantity;* and into affirmative, or negative, is called their *quality*.

Q. In what cases are the predicates of propositions either universal or particular?

A. *In all affirmative propositions, the predicate is particular*, or is taken only in a part of its extension. For in itself, it is commonly a more general term than the subject, it being usually a genus of which the subject is a species. But, when affirmed of its subject, it is restrained to the same extension; to every part of which, and no more, it is declared applicable. For example,

Every horse is an animal.

Here, the predicate, animal, is barely declared to embrace every individual of the subject, horse; and is understood in no greater extension. But, on the contrary, a species cannot be predicated of a genus; as if we should say, *Every animal is a horse;* by reason of the greater extension of the subject, with a part of which only, the predicate is commensurate.

Q. How is the case altered in negative propositions?

A. *In all negative propositions, the predicate is universal*, or is taken in the whole of its extension. Thus,

No man is omniscient.

Here omniscience is denied universally of every individual included within the range of the subject. Or, this proposition, *No bird is a quadruped*, implies, that to every individual thing included under bird, the idea of quadruped is repugnant.

So, in this proposition, *A spirit is not an animal*, we exclude all sorts and kinds, and particular animals whatsoever from the idea of a spirit.—*Watts' Logic, part 2, chap. 2, sec. 2.*

Q. What is another distinction of universal propositions?

A. Into *collective* universals, and *distributive* universals.

Q. What is the nature of a *collective* universal?

A. In a collective universal proposition, the term *all* in the subject, is taken collectively for all its parts united together; and the predicate belongs to the subject in its *collective sense*, as a whole, and not *to the parts or individuals separately.*

Instances of the collective universal are such as these:

All the members formed a committee.
All the soldiers formed a square.
All these apples will fill a bushel.

Obs. In these propositions it is obvious, that the predicate belongs not to the individuals separately, but to the whole collective idea.

Q. What is the nature of a *distributive* universal?

A. In a distributive universal, the predicate is applicable either to the whole subject, or to each of its parts separately; so that the word *all* in the subject may be changed into *every* or *one*, and yet the same predicate agree with it. By this means it is distinguished from a collective.

Instances of a distributive universal, are the most common on all occasions, as,

All men are mortal.
Every circle has a centre and circumference.
All vegetables are combustible.

Obs. In these propositions, we may affirm the same predicate of the whole collective idea, or of any particular part of it; or they are true either in a collective or distributive sense.

NOTE.—"When a *universal term* is taken *distributively*, sometimes it includes all the individuals contained in its inferior species; as when we say, *every sickness has a tendency to death*, we mean *every individual sickness*, as well as *every kind*.

But sometimes it includes no more than merely *each species or kind;* as when the evangelist says, *Christ healed every disease*, or, *every disease was healed by Christ*, that is, *every kind* of disease."—*Watts' Logic*, chap. 2. sec. 1.

SECTION FOURTH.

OPPOSITION AND CONVERSION OF PROPOSITIONS.

Q. When are propositions said to be opposite?

A. "*Two propositions which have the same subject and the same predicate, are said to be opposite, when one absolutely denies, in whole or in part, what the other affirms.*"—*Hedge*, No. 66.

Q. What is the first of the varieties?

A. "First, a universal affirmative may be opposed to a particular negative," as,

All men are rational beings.
Some men are not rational beings.

Here the one denies in part what the other affirms. These are called *contradictory*, and can never be both true or both false at the same time.

Q. What is a second variety?

A. "Secondly, a universal affirmative may oppose a universal negative," as,

Every vine is a tree.
No vine is a tree.

Here the one denies in the whole what the other affirms. These are styled *contrary*; they may be both false, but they cannot be both true.

Q. What is a third variety?

A. "Thirdly, a particular affirmative may be opposed to a particular negative," as,

Some men are prosperous.
Some men are not prosperous.

Two propositions, which differ only in quality, are called *subcontrary*. These may be both true, but they cannot be both false, at the same time.

Q. What is a fourth variety?

A. Fourthly, propositions which agree in quality, but differ in quantity, are called *subaltern*; though these are not properly opposite, as,

All men are liable to err.
Some men are liable to err.

Obs. If the universal proposition be true, the subordinate must be true also ; but if the universal be false, yet the subordinate may be true.—*Kirwan*, No. 156.

Q. What is the conversion of propositions ?

A. *It is the transposition of the subject and predicate, so that the one shall take the place of the other, with the preservation of truth.* This may be done wheresoever the predicate and the subject have exactly the same extension or the same comprehension. Thus,

Religion is the truest wisdom, and the truest wisdom is religion
The wages of sin is death, and death is the wages of sin.
Wine is the juice of the grape, and the juice of the grape is wine.

Such are called *reciprocal propositions*, and the subject and predicate are reciprocal or *convertible* terms.—*Watts' Logic*, part 2. chap. 2.

The above are examples of *simple* conversion only ; the other distinctions of conversion, as treated at length by some writers, are deemed unimportant.

SECTION FIFTH.

ABSOLUTE AND CONDITIONAL PROPOSITIONS.

Q. What is an absolute proposition ?

A. *Absolute propositions are those in which we affirm some property of the subject, which is inseparable from its very nature;* and which therefore belongs to it in all possible cases. As,

God is good.
Time is fleeting.

Hence, as such propositions state a truth which is *necessary*, *constant*, *or certain*, the connexion of the predicate with the subject is also necessary, constant, or certain, and may be affirmed in an *absolute manner*. Thus, *That all circles are round : That all the radii of the same circle are equal: That no triangle is equal to three right angles :* are truths *mathematically* necessary. And these, *That all causes precede their effects*, or that *No man is omniscient, no number infinite*, are *metaphysically* necessary.

Likewise, many absolute propositions involve truths only *physically* necessary ; that is, according to the established course of nature; as, *All men are mortal*, *No man can fly* ; or, *morally* necessary; as, *Mankind will differ in opinion*, *Vice sooner or later brings misery.* These, and the like *necessary* truths, may be couched in absolute or categorical propositions.

On the contrary, when the general proposition is most commonly true, but yet is subject to many exceptions, it requires the qualified form; as,

Women are *commonly* talkative.
Consumptions are *generally* incurable.

In all cases where the connexion or disconnexion between the subject and predicate is *contingent*, the proposition, to be true, must be either a qualified or conditional one. Such are most general propositions respecting natural events, and the voluntary actions of men.

Q. What are *conditional propositions?*

A. They are those in which the predicate is not necessarily connected with the subject, but is applicable only when the subject is qualified by some condition annexed to it; whence they are called *conditional.* Thus, *If a stone be exposed to the rays of the sun*, it will contract some degree of heat.

Here the first part of the proposition expresses the condition, upon which the predicate agrees with the subject.

Q. Why is it important to distinguish carefully in cases of absolute and conditional propositions?

A. A due attention to this renders propositions precise and determinate. If we are careful never to affirm things absolutely, but where the ideas invariably agree: and if where the agreement is conditional, we distinctly mark the conditions which determine the predicate to belong to the subject; we shall be less liable to mistake in the application of general truths to particular cases; and shall not deal in general unqualified assertions, alike incapable of proof, and of producing conviction.

Q. What is the great advantage of conditional propositions for embodying general truths?*

A. Particular truths are of little importance in comparison with universals; to discover which, is the great end and aim of science. Now, the advantage arising from accurately determining the condition upon which one idea may be affirmed or denied of another, is this; that particular propositions by this means really become universal: and when once demonstrated, the general truths contained in them may be admitted with certainty into our reasonings, and applied with safety in a multitude of particular cases. For example: if we say, *some water acts very forcibly;* the proposition is particular; and as the conditions upon which this forcible action depends are not mentioned, it is as yet uncertain in what cases it may be applied. By supplying these conditions, the proposition will run thus: *water conveyed in sufficient quantity along a steep descent, acts very forcibly.* The proposition in this new form involves a general truth; inasmuch as the predicate *forcible action* may be ascribed to all water under the circumstances mentioned. This general truth is of easy application in all practical cases, as in the operation of machinery and other works of art.—*Duncan's Logic.*

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* On the advantages of general terms and universal propositions, Dr. Reid thus remarks: "It is by means of such extensive and comprehensive propositions, that human knowledge is condensed as it were into a size adapted to the capacity of the human mind, with great addition to its beauty, and without any diminution of its distinctness and perspicuity. Thus the wisdom of ages, and the most sublime theorems of science, may be laid up like an Iliad in a nutshell, and transmitted to future generations."—*Essay* v. chap. i.

Q. How is the utility of conditional propositions illustrated from natural philosophy?

A. The demonstrations in natural philosophy being employed, not about the abstract properties and necessary relations of things, but about the mutable qualities and variable operations of matter; could no otherwise be framed into general truths, than by means of conditional propositions, which ascertain and define precisely under what circumstances, the several phenomena take place. In this manner, by a proper induction from similar facts, universal propositions are formed, which, when demonstrated, become general principles of science, each including a multitude of particular truths, applicable to the various purposes of life

SECTION SIXTH.

COMPOUND PROPOSITIONS.

Q. What is a compound proposition?

A. *A compound proposition is one which is made up of two or more subjects, or predicates, or both; and may be resolved into two or more propositions*—as,

Europe, Asia, Africa, and America, are quarters of the globe.

As the predicate *quarters of the globe*, may be separately affirmed of each of the subjects, this proposition may be resolved into four simple ones. As,

Europe is a quarter of the globe.
Asia is a quarter of the globe, &c.

Again—*Gold is weighty, ductile, and fusible.*

Here, as the three predicates are separately applicable to the subject *gold*, they may be connected in as many distinct propositions. As,

Gold is weighty, gold is ductile, gold is fusible.

Q. What maxim holds true of all compound propositions?

A. Every compound proposition may be resolved into as many single ones as there are different ideas separately compared in it; or, as there are subjects and predicates in it, which are separately applicable to each other. So, this proposition,

Socrates, *Plato* and *Aristotle*, *were philosophers*, *moralists and politicians*; may be reduced to nine distinct propositions.

Q. What single propositions have the appearance of being compound?

A. Such as have two words in the subject or predicate so connected in sense, that they must be taken conjointly, and cannot be resolved into two propositions. Thus,

Light and darkness are contraries.
Ye cannot serve God and Mammon.

These are complex propositions, but yet they are single, since they cannot be resolved, &c.

Q. How may compound propositions be distinguished from those that are merely complex?

A. In all compound propositions, the parts, whether subjects or predicates, are independent of each other, and may be taken separately as well as conjointly. But in complex propositions, the qualifying or explanatory words which render the proposition complex, must be considered as real and inseparable parts of the subject or predicate to which they are annexed. This may be seen in the examples already given.

Q. How are the various sorts of compound propositions distinguished and denominated?

A. They are distinguished into six sorts, viz.: *copulative*, *disjunctive*, *conditional*, *causal*, *relative*, and *discretive*; which are so called, from the *particles* of the same name, that compose a part of their subject or predicate.

Q. What may serve as examples of *copulative* and *conditional* propositions, (which have already been described)?

A. *Ex.* Of the copulative:

Riches and honours are temptations to luxury and pride.

Of conditional:

If the sun be fixed, the earth must move.
If the rains cease, the springs will subside.

Q. What are *disjunctive propositions?*

A. They are those in which we affirm, that of several predicates compared with the same subject, some one necessarily belongs to it; but leave the particular one undetermined. As,

This world either exists of itself, or it exists by chance, or it is the work of some all-wise and powerful cause.

Here it is evident, that one of the three predicates enumerated must belong to *world*, the subject, but the proposition does not determine which.

Q. What is a second variety?

A. Sometimes also, two or more subjects disjunctively conjoined, are compared with one predicate. As,

Either holiness, or sin, predominates in every man.

Here the predicate is affirmed of one of the subjects to the exclusion of the other, but the particular one is left undetermined.

Q. What are *causal propositions?*

A. They are those in which, two propositions are joined by causal particles; such as, *that*, *because*. As,

Rehoboam was unhappy, *because* he followed evil counsels.
The children were cast out, *that* they might not live.

By means of these *causal* particles, one part of the proposition is assigned as the cause of the other, and the truth of the whole arises from the assigning of the right cause.

Q. What is the peculiar structure of *relative propositions?*

A. They have their parts joined by such particles as express a relation or comparison of one thing to another. Thus,

As much money as you possess, *so* much credit you will have.
As is the father, *so* is the son.

Q. What is the nature of a *discretive* proposition ?

A. "A discretive proposition consists of two parts, which are contrasted by reason of some apparent opposition or inconsistency intimated by the particles *but*, *though*, *notwithstanding*, and the like."—*Hedge*. No. 79. As,

Job was patient *though* his grief was great.
Hannibal was a great general, *but* was finally unfortunate.
Haman was miserable, *notwithstanding* his riches and honours.

CHAPTER II.

OF JUDGMENT, AND THE DIFFERENT KINDS OF EVIDENCE UPON WHICH IT IS GROUNDED.

SECTION FIRST.

OF JUDGMENT.

Q. What is judgment?

A. Judgment is an act of the mind, joining or disjoining two ideas compared together, according as they are perceived to agree or disagree.

If the relation between the two objects is perceived to be that of agreement, they are joined together by affirmation; if that of disagreement, they are disjoined by a negation.

Q. In what manner is this relation discerned in simple comparisons, or *intuitive judgments?*

A. In a simple comparison the relation is discerned by barely contemplating the objects compared, without reference to any thing else. So in all intuitive judgments, the evidence which determines the mind is contained in the ideas compared together, and is not something extraneous to them. The following are given as examples of intuitive judgments or axioms, viz.

That a part is less than the whole.
Things equal to one and the same thing, are equal to one another.
Two and three are equal to five.

Q. What is the meaning of evidence as concerned in intuitive judgments?

A. It is that which evinces to our perception the agreement or disagreement of the ideas compared, according to which the judgment is determined.

Q. How does this *perception* differ from judgment itself?

A. The perception of the relation between the ideas or objects compared, is the antecedent act; judgment is the determination of the mind that follows this perception.—*Kirwan's Logic*, No. 242.

When this relation cannot be traced without some other intermediate idea, to which the objects compared have a known relation, this is an act of reasoning. As when we say, five times eight is equal to four times ten, *because they are each equal to forty.*

Q. How is judgment usually distinguished from reasoning?

A. The term judgment is applied to those propositions which involve two ideas only, or a single comparison; the truth of which may be known or determined without the intervention of any third idea, or medium of proof.

Reasoning consists of one or more deductive steps inferred by means of intermediate ideas, which show the relation between the two parts of the proposition, subject and predicate. The former are *simple* judgments, the latter are processes. Likewise the evidence upon which simple judgments or *self-evident* truths are founded, is called *intuitive evidence;* and that which is employed in reasoning, *deductive* or *demonstrative.*

Q. What may be remarked respecting the nature, number, and use of self-evident truths?

A. Self-evident truths are such as neither require nor admit of any proof, since they carry their own evidence, and command the assent of all who comprehend the terms in which they are expressed. In every science there are *many* self-evident truths, axioms, or first principles, upon which all knowledge gained by reasoning must be built. —*Reid, Essay* 6. chap. 4.

" Without first principles analytical reasoning could have no end, and synthetical reasoning could have no beginning."—*Ibid.*

Obs. The consideration of these immediate and intuitive judgments, together with the evidence by which their truth is evinced without reasoning, belongs to the second part of logic.

Demonstrable propositions, and those whose truth is manifested by one or more deductive steps, or proofs, are the proper province of the reasoning faculty, and are referred to the third division, or *Reasoning*.

Q What are the principal kinds of intuitive evidence, or the grounds of immediate judgment?

A. They are the evidence of *sense*, of *consciousness*, of *memory*, and of *axioms* or *first principles*: to which is commonly added, that of the relation between *cause and effect*.

SECTION SECOND.

INTUITIVE EVIDENCE.

Q. What may be remarked respecting the evidence of the *senses?*

A. The testimony of the senses produces certainty and assurance relative to all the objects of which they give us information

The bulk of mankind feel more certain that things are as their senses represent them, than they do of any truths which are demonstrated by philosophy.

That the bodies which we see and handle do exist, and that the operations which we clearly perceive are real, we can no more question than we can our own existence. "The evidence of the actual perception of our senses is equal to that of any demonstration."—*Kirwan's Logic*, No. 333.

Obs. The testimony of our senses begets assurance in a different way from what mathematical evidence does, and must be resolved into a law of our nature. The judgments grounded upon the evidence of sense, and the assurance that accompanies them, are alike perfect in all men.-*Reid.*

Q. What parts of knowledge are grounded on the evidence of the external senses?

A. "All our knowledge of the nature, powers, and qualities, of material objects." Also, our knowledge of the human character, in so far as it is exhibited in the life and conduct, is built upon the testimony of the senses.

On the same foundation rest all the truths relative to physical science;—the events of history;—and all those deductions of experience which direct us in the preservation of life and health, and in the acquisition of temporal advantages.

Q. What degrees of certainty attend the evidence of *Consciousness?*

A. The evidence of consciousness produces absolute certainty, as to the existence of whatever passes in our own minds, and there comes under its notice: so that no other evidence relative to the same facts is to be admitted in opposition to it. "No kind of evidence can go beyond that of consciousness."—*Reid*, *Essay* 6. chap. 5.

Q. Of what are we assured by consciousness?

A. By the immediate evidence of consciousness, we are assured of the present existence of our various sensations, passions, affections, desires, and purposes; as well as of our intellectual operations. It is by his consciousness that each one is enabled to know his own heart and character, provided he carefully compares his moral exercises with the standard of truth.

Q. What whole science is built entirely on the evidence of consciousness?

A. It is the science of the human mind. "No branch of knowledge stands on a surer foundation than this," provided, all our conclusions are deduced from facts which are completely ascertained by our own consciousness.—*Reid*, *Essay* 6. chap. 5.

Cor. Hence, in so far as any maxims or deductions in philosophy, morality, or experimental theology, contradict or militate against, the subjects of our consciousness that are matters of fact clearly ascertained; our conviction of their truth and certainty must be proportionally weakened and impaired. Nor can such maxims beget assurance and assent in the mind of any one, till his own consciousness is able to yield a testimony in accordance with them. Without such testimony of consciousness, they are admitted merely upon authority without evidence.

Q. For what part of our knowledge do we rely on the evidence of *memory*?

A. The evidence of memory gives us immediate and certain knowledge of things past, whether they be external events or internal operations. It is one of the *fundamental laws of human belief*, that we uniformly admit the certainty of what we distinctly remember, insomuch that the lapse of time does not weaken the belief of past facts and occurrences, of which we have a clear remembrance;

this is evident in the case of every aged man recounting the events of his childhood and youth.

Q. In what other instances is the evidence of memory admitted as certain?

A. The certain evidence of memory is admitted by mankind in all comparisons of their past with their present selves, and in that perfect confidence with which they rely upon their past experience. Likewise, the testimony of witnesses in courts of justice, by which causes are decided that involve the lives and fortunes of men, depends for its correctness chiefly on the fidelity of memory to the facts attested.

Q. How does it appear that the same reliance on memory is requisite in matters of science?

A. In yielding our assent to the conclusion to which a mathematical demonstration leads, we evidently trust to the fidelity with which our memory has connected the different links of the chain together. "Deny the evidence of memory as a ground of certain knowledge, and you destroy the foundations of mathematical science as completely as if you were to deny the truth of the axioms assumed by Euclid."—*Stewart's Elements*, chap. 1. section 2. On this same principle also, propositions which have once been found to be true by a careful investigation of their proofs; may at all times be relied on as present knowledge, as firmly as if the reasons establishing their truth were present to the mind.

Q. What peculiarity respecting the evidence of *sense, consciousness*, and *memory*, and the judgments that accompany them, is worthy of notice?

A. These kinds of evidence are called *intuitive*, although they are different from the evidence of axioms which is perceived by intellect; and the judgments grounded on them are immediate and necessary. Also because the *truths* of which we are assured by perception, consciousness, and memory, are matters of knowledge without reasoning, they have been called *laws of human belief. Stewart's Elements*, chap. 1. sec. 2.

On the connexion between cause and effect.

Q. By what evidence do we conclude *that every thing which begins to exist must have a cause?*

A. The evidence upon which this truth rests, is *immediate and irresistible*, and has commanded the general belief of mankind. This is to be admitted as a first or self-evident principle, that needs no proof, and that is incapable of any proof by argument; but is one of the laws of human belief, which is the gift of the Creator.

Q. How does it appear that an infallible connexion between effects and their efficient causes is a principle of belief universally admitted?

A. This is a principle that has been handed down since the first ages of philosophy. It was acknowledged in that standing maxim of the ancients, *ex nihilo nihil fit*. Besides, that every event must proceed from some cause, is a fact understood and admitted by children, previous to any direct instruction on the subject, as has been fully ascertained by experiment; and is also a dictate of natural judgment in savages. "The vulgar adhere to this maxim as firmly and universally as the philosophers. Mankind not only assent to it in speculation, but the practice of life is grounded upon it in the most important matters; and it is impossible to act with common prudence if we set it aside." *Reid, Essay VI.* chap. 6.

Q. What one proof of the divine existence rests upon this principle?

A. The existence of a first cause is necessarily inferred from our own existence, and the existence of things around us, *which had a beginning;* since, *what begins to exist must have a cause of its existence.* Or, in other words; since *every being that began to exist has had a cause*, there must be one *Being* uncaused, and the cause of the existence of all others.

Q. Why has this argument been thought to come short of absolute demonstration?

A. Because the principle, *that every effect must have a cause*, differs from the truth of a mathematical axiom, inasmuch as the latter is perceived by intellect, and the former is an *immediate* natural judgment; hence the argument founded on this principle, although equally satisfactory with a mathematical proof, is yet not of the nature of the strictest demonstration. The conclusion can never be stronger, or more certain than the premises.

Obs. "*Causation*, denotes the relation which has connected a cause with its effect." We say, *has connected*, because nothing can be denominated a *cause* until it has produced its *effect*" "We perceive no causality or efficiency in any natural cause; but only a connexion established by the course of nature between it and what is called its effects." *Stw. Elem.* chap. 4 sec. 1. Natural or secondary causes, by which we understand "the established conjunctions of successive events," are in fact, not the causes of the various changes which they precede, but are the *effects* of a divine operation Power and efficiency are attributes of mind, and not of matter; and "the sole efficient cause of these changes, is the supreme Author of nature himself." —*Kirwan*, No. 717.

SECTION THIRD.

Experience and Testimony the grounds of moral or probable reasoning.

OF EXPERIENCE.

Q. What is meant by experience, as the ground of natural science?

A. *It is the knowledge of nature gained by trial and observation, through the medium of sense and memory.*

The following analysis of the different sorts of evidence, and of the knowledge, *certain* or *probable*, that is founded on them, is given by Dr. Beattie:

"All the objects of the human understanding may be reduced to two classes, viz. *abstract ideas*, and *things really existing*. Of *abstract ideas*, and *their relations*, all our knowledge is certain, being founded on *mathematical evidence*, which comprehends: I. Intuitive evidence; and, II. The evidence of strict demonstration. We judge of things really existing either, 1. From our own experience; or, 2. From the experience of other men.

1. Judging of real existences from *our own experience*, we attain either certainty or probability. Our knowledge is *certain*, when supported by the evidence, 1. Of sense external or internal. 2. Of memory. 3. Of legitimate inferences of the cause from the effect. Our knowledge is *probable*, when from facts already experienced we argue. 1. To facts of the same kind not experienced, (by induction); and, 2. To facts of a similar kind not experienced, (by analogy.)

2. Judging of real existences from *the experience of other men*, we have the evidence of their testimony. The mode of understanding produced by that evidence, is properly called *faith*, and this faith sometimes amounts to *probable opinion*, and sometimes rises even to absolute certainty."—*Essay on Truth*, hap. 2. sec. 1.

Q. With what objects is experience chiefly conversant, in furnishing us with knowledge?

A. 1. The objects of sense, or those bodies that constitute the material world; their properties, and powers to act upon and influence one another. 2. The succession of events in the natural world, and the actions of men so far as they fall under the notice of the senses; all which come under the general denomination of *facts*, and are known only by experience.

Q. How does it appear that the several powers and properties of bodies can be learned only by experience?

A. It is manifest, that the discoveries relating to electricity, the powers and properties of the loadstone, the force of gunpowder, of water, of steam, and numberless other discoveries, were not gained by abstract reasoning, inferring the effect from the cause; but by means of experiments made with the bodies themselves. One single experiment lays that open in an instant, which all the sagacity and invention of men could never of themselves have been able to trace. The same holds true in all parts of natural science.

Q. How does it appear that the co-existence of sensible qualities in bodies can be known only by experience?

A. Ivory, for instance, is both hard and elastic, which fact we know by experience; but previous to experiment, it would have been deemed incredible, that two qualities apparently so opposite, should exist together in the same substance. And so in bodies generally, it cannot be determined how far the presence of one quality proves the existence of another in connexion with it; or between what qualities there is an absolute repugnance to co-exist; otherwise than by experiment.

Q. How is the action of bodies one upon another ascertained?

A. By experience alone. That the bite of a viper will kill: That fire dissolves one body, and hardens another: That some plants are salutary, others noxious: That cold will congeal water, and heat cause it to boil, and the like; are facts known only by experience.

Q. To what is it owing that the moderns have so much excelled the ancients in the improvement of natural knowledge?

A. It is owing to their testing every thing by experiment. While the philosophy of Aristotle prevailed in the schools, and men endeavoured to account for most of the phenomena of nature from *occult qualities*, *sympathies*, *antipathies*, and such like terms without meaning; the knowledge of nature was at a stand: but since the time of Bacon, who introduced the method of experiment and induction as the only correct modes of philosophizing, great advances have been made in all branches of physical science.

Q. In what respect can experience be considered as *evidence?*

A. As experience terminates in knowledge of its particular objects, it is not to be considered as evidence in relation to itself: but on the contrary, this very experience is founded on the *evidence of sense*, aided by memory. We remark then, that experience, when considered as evidence, is more properly the knowledge of single facts and particular truths; and in this sense it is the evidence upon which general conclusions are founded.* Thus by collecting many particular truths, or single facts known by experience, we form one general conclusion respecting a whole class of objects: this process is called *induction;* which is, inferring a general truth from several particulars. Experience, therefore, bears the same relation to induction, as the parts do to the whole; and is the evidence on which inductive conclusions are founded.

Q. Of what other knowledge is experience the evidence and ultimate foundation?

A. It is the foundation of our conclusions from *analogy.* This is a species of reasoning that proceeds on the general principle, that *nature is consistent and uniform in her operations,* so that from similar circumstances similar effects may be expected; and this general principle is founded on experience.

Q. How is experience also the foundation of testimony?

A. Human testimony is the evidence to which we must be chiefly indebted for our knowledge of such facts as have not fallen under our own particular observation; and the truth of these facts rests ultimately on the experience of such persons as have had sufficient opportunity for ascertaining their reality. Such are all human actions that are already past, they having no longer any existence; also, most of the facts and operations in nature, which become the foundation of our knowledge of body, have not fallen under our own personal observation, but are to be learned from the representations of others.

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* When an object so circumstanced is presented to the senses, as we remember it to have been presented, when succeeded by certain particular consequences; and from this recollection, the mind immediately anticipates the appearance of the customary consequence; this is called an exercise of experience."—*Campbell's Lectures*, book 1. chap. 5.

Q. What kind of experience is sufficient to produce certain knowledge of a fact?

A. That experience which results from *sufficient discernment*, *opportunity*, *and attention*, on the part of the witness, is conclusive evidence of its truth and reality to his mind; and the testimony of one witness, of known veracity, is enough to establish the truth of a fact thus experienced, provided the fact be not of an extraordinary nature, nor contrary to general experience.—*Kirwan's Logic*, chap. *VII.* sec. *III.*

SECTION FOURTH.

OF TESTIMONY.

Q. What is testimony?

A. *Testimony is a serious intimation from another, of any fact, or observation, as being what he remembers to have seen, or heard, or experienced.*

Q. For what part of our knowledge must we depend on the testimony of others?

A. It is only by testimony that we can be certain of the *existence* of things, persons, or events, which our own senses have not witnessed, and of which we have no *direct* proof: hence, for the most of our knowledge of what are styled *facts*, we rely upon the testimony of others.

Q. In relation to what, is testimony accounted a third ground of human judgment?

A. As *intuition* is the ground of judgment in scientifical knowledge, and *experience* in natural knowledge; so *testimony* is the ground of judgment in historical knowledge.

Q. How do facts differ from truths?

A. Truths are founded in the relations of things, which relations remain stable and permanent. The evidence, therefore, on which truths rest, is inherent in things, and remains at all times to be reviewed by the mind. Facts, are either things done, or events taking place, which are transient in their existence, and can no other ways be known originally, than either directly by the senses of some persons who witness them at the time, or indirectly by the effects and appearances they may leave behind them. The former are called *necessary*, the latter *contingent truths.*

Obs. To prove facts, therefore, is not to show the inward nature and relations of things, but is simply to manifest their existence.

Q. In judging of facts upon the evidence of human testimony, what circumstances on the part of the witness are to be regarded, in regulating our judgment and belief?

A. If it be the testimony of a single witness upon which we judge, we are to regard his competency, and opportunity for ascertaining the fact; and his integrity, disinterestedness, and design in reporting it.

Q. By what principle ought our assent to be regulated, in order to correct judgment?

A. *Assent ought in all cases to be proportioned to the different degrees of evidence.*

"I think, (says Dr. Reid,) in most cases we measure the degrees of evidence by the effect they have upon a sound understanding, when comprehended clearly and without prejudice."—*Essay* 7. chap. 3.

Q. How are the different degrees of assent usually denominated?

A. "These are, *conviction*, *certainty*, *belief*, *persuasion*, *presumption*, *opinion*, or *doubt*," according to the strength of the evidence or proofs that produce them.—*Kirwan. Log*. No. 324.

Q. How are facts distinguished into their *different kinds?*

A. The distinctions are,

1. Common facts; as the striking of a bell, a funeral procession.

2. Indifferent or equi-casual facts; as whether any ship arrived at a certain port on such a day; or, whether next Christmas day will be clear or cloudy.

3. Extraordinary facts, such as, a shower of stones from the sky ; a frost in the month of June.

4. Marvellous facts, such as certain monstrous births ; the strength of Sampson ; the effects of gunpowder.

Lastly, Supernatural or miraculous facts, as the appearance of angels in a human form ; the dividing of the Red Sea ; the resurrection of Christ.

Obs. According as the asserted facts are such as to contradict, or coincide with, common experience in similar circumstances ; they are said to possess greater or less *internal probability.*

Q. What general rule is applicable to the different kinds of facts ?

A. It is this, viz. that where the internal probability is less, more and stronger evidence is required to produce belief; nevertheless, those that are in themselves in the highest degree improbable, as not according with our experience, are capable of full and satisfactory proof from human testimony. Such is the nature of the proof, wherever the facts are so circumstanced, and the testimony so conditioned, as to afford all the evidence that the nature of the case would admit.

Q. What is another general principle important to be noticed in judging of facts ?

A. It is this : that as there is no medium in things between truth and falsehood, but every rational proposition is either true or false ; so every fact received upon testimony, either did or did not exist. Its truth or falsehood, although inscrutable to us, is not affected by what we believe or disbelieve respecting it. All doubt and uncertainty arising from the want of evidence, or from conflicting probabilities, is the effect of our limited powers, and scanty knowledge ; every truth is alike clear and certain in the view of Omniscience.

PART THIRD.

OF REASONING.

Logical truth consists in the conformity of our judgments, to the real properties and relations of things. But yet "truth properly belongs to propositions;"* since, *whatever is evidently contained in the idea of any thing, may with certainty be affirmed of that thing*, and whatever relations in things are discoverable by judgment, are in propositions affirmed to subsist between the terms, subject and predicate.

To ascertain the truth of any proposition, is to discern the agreement or disagreement of the subject and predicate, as therein asserted. To prove a proposition is to manifest its truth. When we are able to judge of the truth or falsehood of a proposition, by the bare contemplation of its terms, both the evidence and the judgment are called *intuitive*. But when the truth of a proposition cannot be determined without the aid of some *middle term* to manifest the relation between the subject and predicate, the conclusion obtained by means of such intermediate step or steps, is called *deductive*; and the process by which the conclusion is inferred in this manner, is styled *reasoning*.

The middle term which shows the agreement or disagreement of any subject and predicate, is called an *argument* or *proof*. Also, a proof consists sometimes of a series, and at other times of an accumulation of arguments. It is owing to the defective and limited powers of the human understanding that reasoning is necessary, in order to arrive at the truth or falsehood of those propositions, which to our minds are not self-evident. To evince the truth or falsehood, probability or doubtfulness, of such propositions, from other truths already known or generally admitted; is the proper province of the reasoning faculty.

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* Locke.

The objects embraced in this Third part of Logic are, the several kinds and divisions of reasoning, and the nature and method of proof peculiar to each; to which are subjoined such of the sophisms, or fallacious arguments, as are the most remarkable.

CHAPTER I.

OF THE DIFFERENT KINDS OF REASONING.

SECTION FIRST.

DESCRIPTION OF REASONING AND OF SYLLOGISM.

Q. What is reasoning?

A. *Reasoning is a process, by which conclusions either certain or probable are inferred, from truths already known or admitted.*

Q. For what purpose is reasoning employed?

A. It is employed for investigating the relations of ideas brought together in a proposition, when their agreement or disagreement cannot be judged of immediately by the bare contemplation of the subject and predicate. In such cases, we are constrained to introduce a middle term, and to compare each of them with some *third idea*, that by seeing how far they agree or disagree with it, we may determine how far they agree or disagree among themselves.

Illus. Thus, if we wish to determine whether any two objects are of equal or different lengths, and they cannot be placed side by side in order to a comparison; by applying some common measure, as a foot or a yard to each of them separately, their equality or difference may be readily perceived.

Q. What plain example may be given to illustrate the office of a middle term?

A. Take this proposition; *Five times eight are equal to four times ten;* the proof of which may be made out by comparing both of the terms with *forty*, which we make the *middle term;* and then, because they are discovered to be each equal to forty, they are known to be equal to one another.

In familiar reasoning, the process of the mind in arriving at this conclusion would be expressed thus,

Five times eight are equal to four times ten, *because* they are each equal to forty.

Again, if the question to be proved be, *whether God must be worshipped;* we seek a third idea, suppose the idea of Creator, and say;

Our Creator must be worshipped.
God is *our Creator.*
Therefore God must be worshipped.

Here in the two first propositions which are called the *premises*, both parts of the question are compared with the middle term, *our Creator;* and being found to agree with it, they are consequently united in the *conclusion* or third proposition.

Q. In what general truth are all affirmative conclusions founded?

A. In this axiom, *that so far as any two proposed ideas agree with any third, they agree also among themselves;* hence they are connected by an affirmative conclusion, as above.

Q. What is the foundation of all negative conclusions?

A. It is this, *that where one of the two proposed ideas agrees with the third idea, and the other disagrees with it, they must necessarily disagree so far also with one another;* as,

If no stones are *vegetables*, and trees *are vegetables*, then trees are *not* stones; which is a negative conclusion.

Q. What is a *syllogism?*

A. *A syllogism is an argument consisting of three distinct propositions, so disposed, that the last is necessarily inferred from those that go before;* as in the foregoing example.

Q. What are the terms by which the parts of a syllogism are distinguished?

A. The names of the three propositions are, the *major*, the *minor*, and the *conclusion*. The names of the three terms are, the *major*, the *minor*, and the *middle term*.

The predicate of the conclusion is called the *major term*, because it is the most general; and the subject of the conclusion, the *minor term*, because it is the least general; and the *middle term* is that which is introduced as a common measure into both the premises, and with which the major and minor terms are severally compared, before they are put together in the conclusion.

Hence, the subject and predicate of the conclusion are the two terms which have been severally compared with the middle term in the two first propositions, and are themselves connected or disjoined here according to the result of that comparison.

Q. In what consists the principal art and ability in reasoning?

A. It consists in the invention and application of such *intermediate ideas* or *proofs*, as when compared with the others in the question, will ascertain their agreement or repugnancy.

Ex. Suppose it were inquired *whether men are accountable for their actions.* Here the relation between men and accountableness cannot be determined, without some intermediate idea by which it may be traced. If we inquire then, what faculties there are in men, upon which accountableness is founded—these are found to be, *reason* and *liberty;* which, wherever they are bestowed by the Creator, imply accountability. The reasoning therefore, when reduced to a syllogism, will proceed thus;

Major pr. Every creature *possessed of reason and liberty* is accountable for his actions.

Minor. Man is a creature *possessed of reason and liberty.*

Conclu. Therefore man is accountable for his actions.

Q. What do you remark respecting the premises in a syllogism?

A. These previous propositions in a simple act of reasoning must be truths already known or admitted; when they are not such, previous syllogisms are required to establish their truth; in which case, reasoning becomes a complicated operation, taking in a variety of successive steps.

Also, the major proposition, (which is always placed first,) must be sufficiently general to contain the conclusion, and is in fact, always a general proposition. The minor premise, is less general in its extension, and is included under the major. The conclusion is deduced from the two preceding, and is substantially contained in them. Thus,

All animals are vulnerable:
Alligators are animals;
Therefore alligators are vulnerable.

Q. What other principle of the syllogism may be deduced from the last example ?

A. It is this, that the major premise, *all animals are vulnerable*, is assumed upon the ground of experience and observation.

The minor barely asserts the fact, that alligators belong to the more general class *animals*, which in effect is connecting them with the same predicate: if the premises therefore be true, the conclusion must of necessity follow from them; for it is a law of syllogistic reasoning, that *whatever may be affirmed of any general term, may be affirmed of every species and individual included within its extension.*

H. Is there a near resemblance between syllogism, and the common familiar modes of reasoning ?

A. They are substantially the same, differing only in the manner and form. The chief difference lies in this; in familiar reasoning, one part of the syllogism is commonly omitted, while the process is informal, it being expressed in not more than two propositions; the one making the assertion, the other assigning the reason upon which it is grounded. Yet in either mode, the same ideas are brought into comparison, and the same conclusion is inferred from the comparison.

Examples.

Forensically. " All human arts are in some degree imperfect, and government as well as others."*

Syllogistically.

All human arts are in some degree imperfect:
Government is a human art;
Therefore, government is in some degree imperfect.

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* Beattie's Elem. of Moral Science. Part. 3, chap. 2

The same reasoning may be variously expressed; as,

Government must be in some degree imperfect;
Because all human arts are so.

Or, negatively,

Because no human art is perfect.

This last is the latent proposition, which is the real ground of the judgment in the first example, but is there suppressed, as is usually the case in forensic and familiar reasoning. Supply this proposition, and the syllogism is formed thus,

No human art is perfect:
Government is a human art;
Therefore no government is perfect.

Q. What are the signs in common discourse or writing which always imply an act of reasoning?

A. These are: the particle *therefore*, which usually precedes the assigning of a reason; and such causal particles as *for*, *because*, denote an act of reasoning; as well as the relative particles *then*, *hence*, &c. "And wheresoever any of these words are used, there is a perfect syllogism expressed or implied."—*Watts' Logic*, part 3. chap. 2.

For example, when Addison says of Christianity, "It makes man easy here, *because*, it can make him happy hereafter;" this is reduced to a syllogism, Thus,

Whatever *can make man happy hereafter*, makes him easy here:
Christianity *can make man happy hereafter*;
Therefore Christianity makes him easy here.

Obs. The reason upon which the assertion is grounded in familiar reasoning, always becomes the middle term when transferred to a syllogism, as in the last example.

Q. How may any regular syllogism, on the contrary, be expressed in the familiar form of reasoning?

A. By first asserting its conclusion, omitting the illative *therefore*; and then by assigning the reason expressed by its middle term, preceded by some causal particle, as *since*, *for*, or *because*, making this the second proposition Ex.

He that *is always in fear* is not happy:
Covetous men *are always in fear*;
Therefore covetous men are not happy.

This is resolved into the familiar form, thus;

Covetous men are not happy;
Because they are always in fear.

In forensic and familiar reasoning, two propositions are usually sufficient to exhibit the several positions with their proofs; the understandings of others in the mean time supplying the substance of the suppressed proposition.

When the syllogistic form is omitted, "still the syllogism exists in the mind, else the reasoning would not be just; the mind discerns the connexion of the extremes and the middle term *simultaneously*, but it can be expressed in words only successively, and the forms of expression may be more or less explicit."—*Kirwan's Log.* chap. 9. sec. 11. *Vindication of Syllogism versus Locke.*

SECTION SECOND.

OF REASONING IN ITS CONNEXION WITH GENERA AND SPECIES.

Q. According to what two general methods does reasoning proceed.

A. *First*, it begins with referring things to their several classes: or, to the genera and species to which they truly belong.

Secondly, it then ascribes to them the several attributes and properties of the more general classes, in consequence of such distribution.

Note. The design of this section, is to illustrate syllogistic reasoning in reference to these two particulars; and then, *Thirdly*, to shew how in investigating the properties and relations common to whole classes, we obtain general conclusions, or establish general truths.

Q. 1. How may the first operation of reasoning be explained, by which we refer individuals to general classes?

A. In a syllogism, the major proposition is always a universal; the subject of which is either a genus or a species. Now as in these universal propositions, we affirm some property of a genus or a species, it is evident that we cannot apply this property to particular objects, till we have first determined whether they are comprehended under the general subject, of which this property is affirmed. In other words, we must bring the individual under the same general name or class, before it will appear that the same predicate is applicable to it.

Q. How is this illustrated by example ?

A. Thus, it is a property of all *even* numbers that they *are divisible into two equal parts ;* if we would determine whether the same property may be affirmed of an individual, as the number eight for instance ; we must first discover whether it be of the species expressed by that general name, or correspond to the definition of an even number. This correspondence being discovered, the conclusion necessarily follows. The reasoning may be exhibited in the form of a syllogism ; thus,

Every number that may be divided into two equal parts is an even number :
The number eight may be divided into two equal parts ;
Therefore the number eight is an even number.

Obs. This simple example has been adopted, not for the sake of the conclusion, which is too obvious to require any proof ; but chiefly because it is of easy comprehension, and serves at the same time, distinctly to exhibit the steps, which are pursued in every reasoning process of this kind.

Q. How does it appear that the process is the same, whether the connexion of the individual with its species be obvious or not ?

A. This will appear from particular instances : thus, when we see a horse in the fields, or a dog in the street, we readily apply to it the name of the species, or refer it to its class ; we then can as readily infer concerning it the several properties of the species ; but all this facility is in consequence of former operations of thought grown into a habit, and is executed so promptly, as to prevent our observing the steps, by which we arrive at such conclusions. But in other instances, where the idea of the class is very complex, or less familiar to the mind ; we manifestly proceed according to the form of reasoning exhibited above. Thus, when a goldsmith would prove a doubtful piece of metal, to determine whether it be of the *species* called *gold ;*

he first examines its properties, and then compares them with the properties of that species; and upon finding a perfect correspondence between them, he gives it the general name: but if no such correspondence intervene, the conclusion must be of the contrary kind. Just so in every act of reasoning, we refer an individual to its species, or a species to its genus, or the contrary, previous to any conclusion respecting them.

Q. What other instances may serve to illustrate the same process?

A. The process is similar in cases that are complicated, and which require an investigation of several particulars preparatory to a conclusion; as when, for instance, we determine whether a person possesses the qualifications of a christian, and is entitled to the general name; and in like manner, we identify any character, action, or object, with its class, in order that we may affirm of it whatever is predicable of the species to which it belongs; or in case it be found not to be of that class, the contrary conclusion follows.

So from the Divine declaration, "He that believeth shall be saved," we, according to the same general method, may reason thus:

Whoever believeth shall be saved:
Every christian is a believer;
Therefore every christian shall be saved.

Q. How does it appear that this branch of reasoning is of great importance?

A. Some of the most considerable debates among mankind, and such too as involve their lives, interest, and happiness, turn wholly upon this article, viz: the bringing of particular objects under general names or classes. To determine such points is one of the chief employments of the courts of judicature. How important is it in many cases to decide aright, whether an action shall be termed *murder* or *manslaughter?* We see that the very lives and fortunes of men often depend upon these decisions. The reason of this is obvious. Actions when once referred to such a class, defined by law, draw after them all the consequences and penalties sanctioned by law. For as it is allowed, that murder deserves death; by bringing any particular action under the head of murder, we of course decide the punishment due to it.—*Duncan's Logic,* book 3.

Q. How may this process be illustrated by a given example in the form ot a syllogism ?

A. Thus : the law provides that certain actions, as murder, treason, and the like, shall be punished with death.—This statute forms the major proposition of a syllogism, and is a universal. Reasoning begins, by determining whether the particular action in question, does or does not belong to the general class, which is the subject of the major. This point being determined in the minor, the conclusion follows accordingly : as,

Statute. Every *murder* is punishable with death.

Argument. This act being committed with malice *prepense*, &c. is *murder.*

Conclusion. Therefore this act is punishable with death.

Obs. From this example it may be seen, how not only legal statutes, but likewise, all the precepts of religion and morality, become general principles or standards, with which individual actions are compared in our reasonings about them, in order to determine whether they are right or wrong; and consequently, what proportion of praise or blame, of reward or punishment, ought to follow them.

Q. How does the use and importance of this mode of reasoning appear from the practice of mathematicians ?

A. Euclid, for instance, after having defined a square to be *a figure bounded by four equal sides joined together at right angles*, does not proceed to call any particular figure by this name, from its bare appearance : nor until he has demonstrated that its sides and angles are such as correspond to this definition. When he has thus determined any figure to be of that particular species, he is then, and not before, at liberty to ascribe to it all the properties already demonstrated of that figure ; and thereby render it subservient to the future course of his reasoning.—*Duncan*, chap. 4. sec. 6.

Q. Hence how do correct definitions of general terms, and definite ideas of their meaning, become very important in reasoning ?

A. All general words denote classes of things, and definitions enumerate the properties, or lay open the ideas, for which the general name stands.

Now, since definitions thus determine the nature of the species, with which individuals are to be compared, in order to affirm or deny with certainty concerning them ; it is to definitions that we are to resort, in all cases, where we have not precise ideas of the meaning of such general terms.

Q. What may be remarked in continuation ?

A Since our chief aim in this kind of reasoning, is to apply general words rightly to individuals, by which means we bring them under general classes, and in consequence of this, ascribe to them the common properties of the species ; it is plain, that nothing can occasion a difficulty in deciding to what class an individual belongs, but the want of clear and settled ideas of the objects denoted by general words. The comparison is easy, where the things are clearly conceived. If, for instance, we have not determined within ourselves the precise notion denoted by the word *manslaughter* ; it will be impossible for us to decide, whether any particular action ought to bear that name ; because, however nicely we discern the action itself, yet being strangers to the complex idea with which it is to be compared, we are utterly unable to judge of their agreement or disagreement. But the difficulty is removed, when we can distinctly trace the two ideas under consideration.

Q Were the same care to be employed about all other ideas and definitions, as has been employed about those of number and magnitude, what would be the consequence ?

A. Certainty of reasoning might be introduced into other departments of knowledge, besides that of mathematics, to a greater extent than it heretofore has been done. Clear and determinate ideas of the things about which we reason, are the foundation of all *certain* conclusions ; and the want of them is the chief impediment to certainty of reasoning, in subjects that are of a moral and contingent nature.

Q. What may be remarked of Mr. Locke's opinion ?

A. Mr. Locke's opinion, that moral subjects are as capable of demonstration as mathematical, has found but few advocates His reason for this opinion is as follows :—"The precise real essence of the things moral words stand for, may be perfectly known ; and so the congruity or incongruity of the things they stand for, be certainly discovered." He further observes, "definition is the only way whereby the precise meaning of moral words can be known, and yet a way whereby their meaning may be known certainly, and without leaving any room for contest."

In reply to Mr. Locke's reasoning. *Dr. Reid* readily grants, that all abstract propositions admit of this certain knowledge, and then remarks, that the examples given by Mr. Locke, to illustrate his position, are rather metaphysical than moral; but that all propositions that can be properly called moral, are matters of fact; and therefore, not capable of demonstrative evidence, which belongs only to necessary truth

"Morality has its first principles or axioms, many of which are self-evident to every man who has a conscience; but our reasoning from these axioms, to any duty that is not self-evident, can very rarely be called demonstrative."—*Essay* 7. chap. 2.

Q. How may the second operation of reasoning be explained, viz. the ascribing to things their several attributes and properties?

A. As the first part of this branch of reasoning consists in ranking individuals under the general classes to which they belong; the second proceeds by applying general truths to such particular instances as are included under the same general class, or are embraced by the same general principle.

Q. How does it appear that this is the mode of reasoning, the most practised in common life?

A. The reasoning of common life is chiefly about individuals, whence all its conclusions are particular. It consists in applying the general truths of the sciences, and other admitted principles and maxims. to those particular cases that come under consideration. Hence, whether we employ syllogism, or the familiar mode of reasoning; it proceeds by tracing the individual thing, character, or action, to its class or kind, as has been already shown; and then by affirming of it whatever is, or may be affirmed, of the whole class or kind.

Illus. 1. Thus, a guinea for instance, is first admitted to be *gold;* therefore, we infer concerning it, that it *is weighty, is ductile, is fusible,* &c. that it *is heavier than silver, is harder than lead, is more durable than iron, is more valuable,* is *more coveted* &c; and we may affirm of it every other property and accident pertaining to this metal. All these particular conclusions follow from the fact, that such piece of metal is of the species called *gold.*

Illus. 2. In like manner, we infer, that *an African is rational, is social, is moral, is accountable, is immortal*: that he *is entitled to freedom, to the blessings of education and religion,* and *is capable of advancing in knowledge and happiness,* &c. &c. *because* he is a *man.*

These instances may serve to show how all our conclusions, respecting individuals, are obtained, by ascribing to them the properties of the general classes to which they belong.

Obs. The reader may readily perceive, how these several conclusions above, may be formed into so many separate syllogisms; by employing *man* as the middle term in each, and *African* as the subject of the minor, and of the conclusion.

Q. How may the manner of applying general truths to particular cases, be farther shown by example?

A. Thus, these are acknowledged maxims in morals, that *virtuous actions deserve praise, vicious actions deserve blame.* Hence, by referring any particular character or action to these general maxims, we infer, that it is deserving of praise or blame, according as it is found to be of the one or the other class, *virtuous* or *vicious.* Suppose it be Sempronius, whose character is found to be of the class called virtuous; then by the application of the general truth, we reason thus:

Every *virtuous* man is worthy of esteem:
Sempronius is a *virtuous* man;
Therefore Sempronius is worthy of esteem.

Obs. 1. The term *virtuous,* in this example, represents an attribute that distinguishes a class of men, and forms the middle term in the syllogism; this middle term, occurring in the two first propositions, shows the agreement between the terms of the conclusion; *Sempronius,* and *being worthy of esteem.*

Obs. 2. Every middle term must represent either some class of persons or things; as, *all men; every murder;* or else some attribute common to a whole class of beings; as, *virtuous, vicious,* &c.: hence, in a general proposition, it may form either the whole subject, or a part of it, as in the above example; and in a syllogism, its natural place is, to enter into the *subject* of the major proposition as above, and become the *perdicate* of the minor.

Q. How may the uses of a middle term be further shown in inferring particular conclusions ?

A. Since every middle term employed in reasoning, forms a part of a universal proposition ; every general truth with which we are acquainted, contains what may serve as a middle term, for inferring a multitude of separate conclusions respecting the several species and individuals included under it : or, as many separate conclusions may be inferred by means of the same middle term, as there are different species and individuals included under the same general subject.

Obs. Middle terms, so far as they are employed in this part of reasoning, are to be sought for in general truths, of which they may be considered as parts ; and are not so properly *intermediate ideas, as intermediate propositions.*

Q. What consequence hence follows ?

A. It follows, that the greater is the number of general truths with which we are acquainted, the more middle terms are we able to employ in deducing particular conclusions. So from our knowledge of this general truth, *every murder is punishable with death ;* we can infer the same of any particular act that occurs, which is found to be murder : whereas, without an appeal or reference to a general class and general principle (which are always embraced in the major proposition) such conclusion could not be inferred ; and the steps by which it is deduced from the premises could not be expressed. Were we to reason thus,

This act deserves death, *because* it is *murder ;*

still this does not amount to a proof, without the admission of the general truth, *every murder deserves death ;* this being understood as the major proposition.—*See* sec. 1.

Obs. We readily admit with Dr. Brown, that " the natural processes of reasoning, is by two propositions instead of three ;" yet in exhibiting the whole process, or in showing how the middle term in both the premises is connected with the terms of the conclusion, three propositions are necessarily employed.

Q. Does not this account of reasoning suppose that universal propositions are sooner, and better known, than the particular ones which are deduced from them ?

A. It does, and such for the most part is the fact. Although in establishing most general truths, the order of investigation and discovery is from particulars to generals; yet the reverse is the order in which, for the most part, they are received by us in the first instance. In this order, which is called *the method of instruction*, knowledge is usually communicated, and truths evinced to others. Hence it is that "in cultivated society, children from their infancy are accustomed to universal propositions and general truths," which very much facilitate knowledge. *See notes*, p 50 & 76.

From these generals, we reason to particulars. Sometimes we affirm the general truth first, and thence infer the particular one; at other times, we perform the same reasoning, by affirming the particular conclusion first; and then by adducing the general principle in proof of it.—Sometimes both the particular truth, and the general principle in which it is involved, are for the first time, made known, and established, in a single process of reasoning.

Q. Is this branch of reasoning the less worthy to be taught and explained, because the processes are short, and the conclusions often quite obvious?

A. It is not, provided it be a just account of the method we pursue in our reasoning.

"In metaphysical and moral reasoning the processes are always short. The conclusion is but a step or two from the axiom, or first principle, on which it is grounded."—*Reid*, Essay 7.

Besides, it is manifest that every truth we affirm which is not self-evident, admits of a reason, or proof; and this must first be traced by ourselves, or by others for us, in a way of reasoning; in order that we may discern the evidence, or ground on which it rests. All truths, therefore, which are inferences from premises, or are one step removed from first principles; are traced by us, and are evinced to others, by following the method of reasoning explained above.

Q. What are considered the two requisites of a good reasoner?

A. "The first is, an extensive knowledge of those intermediate ideas, by which things may be compared one with another. The second is, the skill and talent of applying them happily in all particular cases that come under consideration."—*Duncan*.

Obs. 1. Now an extensive knowledge of *middle terms*, is little else than an extensive knowledge of those general truths, in which these are involved, as has been explained. Hence it is, that in order to excel in any one branch of learning, or department of reasoning, a knowledge of all the sciences connected with it is accounted necessary; as it furnishes the mind with a store of materials.

Obs. 2. "The highest talent in reasoning," says Dr. Reid, "is the invention of proofs; by which, truths remote from the premises are brought to light." This invention in mathematics, depends on a familiarity with its axioms, with the properties, relations, and ratios of things, previously demonstrated as general truths; in connexion with which, skill and dexterity in applying these as middle terms, for investigating and discovering new truths; constitute the reasoning talent in that science.

Invention of proofs, in any other subject of reasoning, depends chiefly on an extensive and ready knowledge of those general truths and principles connected with it; in the application of which, to the solution of particular questions, investigation and reasoning are mostly employed.— In arithmetic, or grammar, for instance, the ready solution of particular cases that occur, depends on a familiarity with the general principles to which they may be referred.

Q. What one absurdity in the *syllogistic art*, as taught by Aristotle and his followers, is worthy of remark?

A. It was the attempt to give *rules* for the invention and application of middle terms in reasoning; as if by means of these rules, and by a mere mechanical process, propositions might be put to the torture in syllogisms, and be made to confess truths; without one's having any rational knowledge of the question.—*See Reid's brief account of Aristotle's Logic*, book 3, sec. 3.

Obs. Dr Brown, in his attempts to simplify the operations of reasoning, has verged to the opposite extreme.— In remarking on middle terms, as media of proof, he says, "*we do not find them out, but they come to us*, without our willing them." Now, it is not to be supposed, that we must will them, on account of their discovered fitness as subjects of comparison, (which is indeed to suppose them already invented, before we will them,) but, that we do search, and cast about for them, among the materials of our former knowledge, has ever been admitted; and it is when they serve the purpose of suggesting the relation we are in quest of, and not before, that they are discovered to be the right ones.

Q. III. What may be considered the third operation or aim of syllogistic reasoning?

A. It is that which leads to universal conclusions instead of particular, and this it is which distinguishes reasoning as it regards the sciences, from the reasoning of common life. Reasoning, in the sciences, is employed only in establishing general truths; by means of which, the boundaries of human knowledge are enlarged.*

Obs. General conclusions however, are not confined exclusively to the *exact sciences;* but they are deduced in our reasonings on other subjects, especially those of morality and theology; so far as there are acknowledged principles to serve as premises. This will be manifest from what follows.

Q. How may it be shown that in such reasonings we *investigate the properties and relations of whole classes of beings*—or of "general ideas," as Duncan expresses it?

A. Thus, of a triangle for instance, when we find a side, we investigate a property; and when we find an angle, we investigate a relation. In like manner, when we prove "the equality of all triangles to two right angles," we investigate a general relation common to all triangles. Also, certain properties and relations are demonstrable of all triangles, all circles, &c.; and such a general property or relation we investigate and prove, in every general proposition of this sort which we demonstrate.

Q. How may the same fact be illustrated in moral reasoning?

A. Thus, when we show concerning man, that *he is spiritual, is rational, is free, is intelligent,* &c. we investigate general properties of the species. And, when we show, that *he is dependent, is accountable, is rewardable or punishable,* we investigate relations common to the whole class, *man.* Also, because the relations, *accountable, rewardable,* &c. are manifest consequences of the properties, *rational and free;* these latter are made the middle term in inferring the former. And so conversely, having the relations of any species given as known truths; from these we can infer the properties of the species; as, *man is accountable*, therefore he must be free. And so in triangles, from the angles given, we deduce their corresponding sides.

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* "To abridge the labour of reasoning and of memory, by directing the attention to general principles instead of particular truths; is the professed aim of all Philosophy."—*Stew. El.* ch. 3. sec. 7.

Obs. "Objects and the relations of objects, are all that reasoning involves; and these must always be involved in every reasoning."—*Dr. Brown*, vol 3.

Q. How may it be shown that several conclusions may follow from the same middle term?

A. Thus, man, because *rational and free*, is accountable, is a proper subject of moral government, of praise, or of blame, of instruction and of discipline.

Again: *man is immortal*, therefore he is capable of an endless increase in knowledge, in holiness, in happiness: or in sin, in guilt and in misery.

Thus, several conclusions are inferred by means of the same middle term; and again, from one of these conclusions many others may be inferred. Still moral conclusions when carried out many steps from first principles, are not strictly dependent on those that precede them, as is the case in mathematical reasoning.

Q. What may be remarked respecting such reasoning processes as being short?

A. The conclusion obtained by a single syllogism is never but one step from the premises, and in moral reasoning the process usually terminates here, there being no more remote conclusion aimed at.

Yet the reasoning may be continued by several successive steps from the premises; or more properly, a number of processes, each complete in itself, may be so connected in a series, that each preceding conclusion shall become the middle term to that which follows: in this manner the last proposition will be deduced from the first. Thus,

Man is rational and free;
Therefore he is accountable for his actions.
He is accountable for his actions;
Therefore he will be judged hereafter.
He will be judged hereafter;
Therefore he will be raised again.
He will be raised again;

Therefore he will live for ever.*
He will live for ever;
Therefore he is capable of endless happiness or misery.

*Sophism -
Assumed [illegible]
[illegible]

Here, in each deductive step, the first proposition is the middle term to the conclusion which follows: and the major proposition in all of them is wanting, to complete the syllogisms.

Q. How may it be shown that a sameness or difference of species is made another foundation of reasoning?

A. Besides deducing the properties and relations pertaining to classes of beings, in so many general conclusions; another object of reasoning is, to trace a sameness or difference in the species about which we reason, as the ground of our conclusions.

Thus,

Negroes are men endued with reason and conscience;
Therefore they are accountable beings.

On the contrary,

Brutes are not endued with reason and conscience;
Therefore they are not accountable beings.

Again, from the assumption, that negroes are a different species from white men, it has been argued, that *they are not entitled to freedom, to education, and religious advantages.*

So also, from the Mahometan doctrine that *women have no souls*, it has been inferred that *they are not to be educated, nor admitted to any of the privileges of men.*

These are arguments founded on alleged differences of species; and they differ from the reasoning which proceeds from the more general to the less general classes of beings; inasmuch as in these, the comparison is between species only.

A multitude of arguments are founded on such differences: but these also when resolved into syllogisms, require each a more general proposition as the major.

Q. How does it appear that the difference between general properties and qualities, is made another ground of inference?

A. Thus—

Light and darkness are opposite qualities;
Therefore, *the presence of the one, must so far as it prevails, exclude the other.*

So the general truth, that *human nature is depraved*, is immediately deduced from its contrariety to holiness, or moral rectitude.

Again, benevolence and malevolence are opposite in their nature and effects: hence we argue the Divine benevolence. Thus;

No being, unless benevolent, can be happy:
The Deity is supremely happy;
Therefore the Deity is a benevolent being.

So general conclusions may be deduced from the same principle.

Ex. Malevolence is attended with unhappiness:
Heavenly minds feel no unhappiness;
Therefore heavenly minds exercise no malevolence.

All differences in the properties and qualities of things that are distinguishable, may be made the foundation of reasoning; but those between which there is the most perfect contrast and contrariety afford the grounds of more evident and certain conclusions.

Obs. Such general attributes abstractly considered, are the subjects of metaphysical reasonings; as, magnitude is of mathematical.

Q. How does it appear that another object of reasoning is, to infer the truth or falsehood of propositions from their conformity or repugnance to other known truths?

A. Thus—

The annual and diurnal revolutions of the earth are indisputable facts:
The system which supposed the sun to move round the earth, involved also the supposition, that the earth was stationary;
That system, therefore, is absurd and false.

Under this head may be included all conclusions drawn from contradictory propositions.

Ex. Of two contradictory propositions, if one be true, the other is necessarily false:
The doctrine that all nations of men are *not* of one blood, is contradictory to the declaration of scripture;
Therefore this doctrine which contradicts the true one, is itself false.

Again,

The law of gravitation extends to all natural bodies;
Therefore *there are no rivers that run up hill*,
Because that would be contrary to the law of gravitation.

Further :

It is the duty of men to repent of their sinful actions :
But no man can feel repentance for that from which he had not power to refrain ;
Therefore men have power to refrain from the sinful actions which they commit.

So again :

This power in men, of refraining from the sinful acts they commit, is consistent with liberty, but is inconsistent with compulsion ;
Therefore men act freely, and not from compulsion.

These examples may serve to illustrate the manner in which we establish the truth or falsehood of propositions, from their compatibility or incompatibility with acknowledged truths. This is the method chiefly pursued in controversial reasonings.

Q. What is an objection usually urged against syllogism ?

A. The most common objection is, that the examples of syllogisms, which logicians have given as illustrations of reasoning, are *lean, meagre, and destitute of proof.*

To this it may be replied, that in simple syllogisms which are made up of three single propositions only ; the premises *must* be assumed as admitted truths, without their proofs accompanying them : for, to state their proofs must lengthen the process, and require more than three single propositions. Yet such proofs may be added, in separate processes, whenever the premises are such as to admit and require them.

This objection may well apply to those artificial and trifling syllogisms which have been employed to exemplify the several varieties of mode and figure in the *syllogistic theory*, or *school logic ;* but it is not true of even most of the simple syllogisms that occur in general reasoning.

As an example of this kind, in addition to the numbers already given ; let the argument in proof of the Divine existence, called *the argument from final causes*, be exhibited in a simple syllogism.

Thus,

A wise and intelligent cause may with certainty be inferred from *marks of design and wisdom in the effect :*
There are the *clearest marks of design and wisdom* in the works of nature ;

Therefore the works of nature are the effect of a wise and intelligent cause.

Can it be affirmed that this argument is destitute of proof: or, that it does not derive its convictive force from its syllogistic form ?

Q. What may be remarked by way of recapitulation ?

A. In the foregoing doctrines and illustrations, the chief of the topics of syllogistic reasoning have been specified and explained.

From the whole it appears, that syllogism operates wholly on general propositions previously established ; whose subjects are classes of beings or of attributes, of which something is predicated as a general principle.

From these, the aims of syllogistic reasoning are ;

First—To deduce particular conclusions from the general truths in which they are involved.

Secondly—To infer general conclusions, as ;

I. By deducing the properties and relations pertaining to whole ranks of beings.

II. From the sameness or difference of the species compared.

III. From the difference of general attributes.

IIII. From their conformity or repugnance to other known truths.

This general outline of the field of syllogistic reasoning, may serve to show what is its peculiar province, and that it is a method of reasoning which is natural, valid, and important, notwithstanding the attempts of several modern writers to prove it to be nugatory and superfluous.

SECTION THIRD.

OF DEMONSTRATIVE REASONING, AND ITS SYLLOGISTIC NATURE.

Q. What is Demonstrative Reasoning?

A. Demonstrative reasoning is that, whose conclusions are drawn either from the nature and inherent properties of the subject, or from some principle of which we are intuitively certain; and also, are truly and necessarily inferred.

Q. About what truths only, can demonstration be employed?

A. Only about independent and *necessary* truths, the subjects of which are those properties and attributes that are conceived abstractly; or, apart from all things really existing.

Of such abstract properties and attributes, which are nothing but what they are conceived to be, we may have a clear and adequate comprehension. These, and the various relations subsisting among them, being wholly independent on things in actual existence, are necessary and immutable.

Obs. All created things are contingent in their existence, depending on the will of their Creator. By reason of their complexity they are imperfectly known; and the partial knowledge we have of them by experience cannot furnish a foundation for certain conclusions.

Their properties, and consequently the relations resulting from those properties, are perpetually changing.—These are matters of fact, and admit not of demonstration.

Q. To what two classes may all demonstrative reasonings be reduced?

A. " These are either metaphysical or they are mathematical."—*Reid.* " Of all the sciences, mathematics is that which admits most largely of demonstration.—*Scott.*

" If," says Dr. Reid, " it should be asked why demonstrative reasoning has so wide a field in mathematics, while in other abstract subjects it is confined within very narrow limits; I conceive this is chiefly owing to the nature of quantity, the object of mathematics."

Q. But, more particularly; what in the nature of mathematical subjects renders them susceptible of strict demonstration?

A. The subjects of mathematical reasoning are number and quantity. Every thing pertaining to these is exact and definite, capable of being accurately measured and defined.

The innumerable parts into which they may be divided, have precise relations and ratios to each other, and to their wholes, which may be clearly traced and distinctly expressed.

They are subject to no change, but are ever and immutably the same. So if all things material were to be annihilated, the science of numbers would remain unaltered, except in its practical uses.

Quantity also, both in its extension and figure, abstractly considered, exists independent of bodies; and as a subject of reasoning, it partakes not of the contingency, complexity, and mutability of material substances; hence, the truths resulting from its invariable properties and relations are necessary and immutable.*

Q. Of what particular use are mathematical figures, and how far are our reasonings dependent on them?

A. These serve to assist the imagination and memory, and to keep the mind steady to its object: still they are imperfect representations of the intellectual figures, having only some appearance of regularity. But their imperfection does not affect the correctness of our conclusions, because our reasoning is not founded upon them, but upon those exact figures comprehended in the definitions. So we may reason about length separate from any other dimension, but no line can be actually drawn to represent it as such. And in all cases, the figures as they are defined are those that form the basis of our reasoning.

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* "Of these mathematical affections of matter, (magnitude and figure) our first notions are no doubt derived from our external senses; but it is equally certain, that the notions of magnitude and figure having once been acquired, the mind is immediately led to consider them as attributes of space, no less than of body; and (abstracting them entirely from the other sensible qualities perceived in conjunction with them,) becomes impressed with an irresistible conviction that their existence is necessary and eternal, and that it would remain unchanged if all the bodies in the universe were annihilated."—*Stew. El.* h. 2. sec. 3.

Q. What circumstances contribute much to the clearness and certainty of mathematical reasoning ?

A. Every mathematical figure and its several parts may be accurately defined so as to distinguish it from all others. Also, each definition includes the whole essence of the thing for which the term stands, leaving no room for any addition or diminution of its ingredients ; but it is otherwise in subjects of moral reasoning. Hence, in connecting terms of such precise meaning, the same ideas are always brought into comparison in the same propositions, and the same relations will subsist between them : so that the truth of the several propositions in a series, will be alike clear to all who comprehend the terms, and the proofs by which they are established.

Q. Can you describe the practice of mathematicians in commencing and conducting their reasonings ?

A. They commence with definitions distinctly unfolding and fixing the meaning of terms. From definitions they deduce their axioms and postulates which serve as principles and standards of reasoning ; next they advance to theorems and problems, establishing all by the strictest rules of demonstration. And as in all their reasonings, no principles are admitted either as premises or proofs, but self-evident truths or propositions previously established ; so self-evidence and certainty attends each step to the conclusion.

Q. Whence is it that the abstract truths founded on the properties and relations of mathematical figures are found to hold true of things really existing ?

A. Although a triangle or a circle is in reality, nothing but what it is conceived and defined to be by the mathematician, since no such perfect figures exist any where in things themselves ; yet the knowledge which he has of the properties and relations belonging to such figures, is nevertheless true and certain, even of things really existing, wherever they possess the properties and relations included in his ideas and definitions : because real things are just so far concerned, and intended to be meant, in mathematical propositions, as *things* really existing correspond to these exact ideas and definitions.—*Locke*.

Obs. All the general truths deduced by abstract reasoning, from our notions of *extension and figure*, (called *the mathematical affections of matter**) will hold concerning the same properties when they have a real existence in matter; because *whatever is true in idea, is unavoidably so also in reality of things, wherever things exist answerably to these ideas.* So the abstract propositions concerning mathematical figures, when demonstrated, hold true in practice; as in navigation, surveying, and mensuration of all kinds; and so universally, as far as the things to which they are applied, correspond to the ideas and definitions from which these general truths are deduced.

Q. When and why do inadequate ideas of things hinder the certainty of our reasoning about those things?

A. It is when the whole complex objects are made the subjects of our reasoning, while we are ignorant of most of their properties; because in this case, our conclusions, in so far as they are deduced from the parts unknown, must be uncertain.

Partial and obscure ideas of the objects connected in a proposition, must preclude any exact comparison, or certain conclusions; since the agreement or disagreement of the unknown parts cannot be traced.

Hence it is, "that the truth of but few universal propositions concerning substances can be certainly known." *Locke's Essays*, b. 4. chap. 4.

Obs. "Partial and inadequate ideas of any object, furnish a sufficient foundation for reasoning, if the conclusions inferred from them extend no further than these ideas or their necessary consequences. Thus, in mathematics, we may reason upon some of the properties of figures without knowing all their properties, or even considering them if they be known."

"So in metaphysics, though our knowledge of the human soul is partial and inadequate, yet from what we do know of it, viz: its capacity of conceiving, and its powers of judging and acting; we infer its immortality."—*Kirwan.* No. 698.

So when Mr. Locke asserts, "that he who has not clear and determinate ideas, cannot form propositions of them of whose truth he can be certain;" the reason is, that the least addition to, or diminution of, the ingredients of ideas, will alter their relations to each other in propositions, and affect the conclusions that are deduced from them.

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* Stewart's Essays, p. 156.

Q. How may it be shown that the mode of reasoning in mathematical demonstration is according to syllogism?

A. First: as syllogism is a process from the more general, to the less general classes of things, it naturally falls in with mathematical reasoning: "for all demonstrations in this science, proceed on the fundamental principle of the syllogism, that *whatever may be affirmed of any genus, may be affirmed of all the species included under it.*"—*Hedge*, No. 154.

Secondly: in mathematical processes the several deductive steps are inferred according to some axiom, or previously demonstrated truth; to which, when not expressed, there is a reference or appeal; and such general truths are always implied as the major propositions of the syllogisms.*

According to Leibnitz, "Euclid's demonstrations are for the most part arguments almost perfectly in form, and when he apparently forms enthymemes, the proposition suppressed will be found in the margin."

Q. How does it appear that the longest demonstration is only a continued chain of syllogisms?

A. It frequently happens that in tracing the more remote relations of our ideas, by several successive steps, each requiring the intervention of a middle term; that the conclusion cannot be made out but in consequence of a series of syllogisms following one another in train. Now if we examine such a process, and observe how the mind setting out with self-evident propositions, couples them together to form a conclusion; how by introducing this conclusion into another syllogism it advances one step further, and so proceeds, making every new discovery subservient to its future progress: we shall then perceive clearly, that reasoning, in the highest exercise of that faculty, as in demonstration, is no more than an orderly combination of simple acts, or a concatenation of syllogisms.—*Duncan's Logic*, book 3. chap. 1.

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* "Every such process of reasoning it is well known, may be resolved into a series of legitimate syllogisms, exhibiting separately and distinctly, each successive link of the demonstration."—*Stew.* vol. 2. ch. 3. sec. 1.

Q. How does it appear that mathematical demonstration possesses absolute certainty in every step of the progression?

A. Since its foundation is laid in definitions and self-evident truths, and the syllogisms are so adjusted one to another, that the propositions severally made use of as premises, are manifest consequences of what goes before; by this means, every conclusion is deduced from known and established truths, so that the very last in the series, how far soever it is continued, will have no less certainty attending it than the original intuitive principles, in which the whole train of reasoning is founded.

Q. What is meant by the other class of demonstrative reasonings, termed metaphysical?

A. "We give the name of mathematical to truths that express the relations of quantities considered abstractly; all other abstract truths may be called metaphysical."—*Reid*.

The principal subjects of metaphysical reasoning are, the existence and attributes of spiritual beings; as, God and the human soul; their modes of knowing and acting, together with the motives from which, and the ends for which they act. To which may be added, the relation of causes to their effects argued *a priori*, and the various possibilities and impossibilities of things deduced in like manner. Also, space and duration being abstract subjects, not depending on material existence, admit of that demonstrative form of reasoning which is styled metaphysical.

Q. What is one peculiarity of metaphysical reasoning?

A. "In metaphysical reasoning the process is always short. The conclusion is but a step or two, seldom more, from the first principle or axiom on which it is grounded, and the different conclusions depend not one upon another. It is otherwise in mathematical reasoning. Here one proposition leads to another, that to a third, and so on without end."—*Reid, Es*. 7. chap. 1.

SECTION FOURTH.

DIFFERENCE BETWEEN MORAL AND DEMONSTRATIVE REASONING.

Q. What are the kinds of *deductive evidence* employed in reasoning ?

A. Deductive evidence is distinguished into two kinds, *moral and demonstrative.*

Q. What is moral evidence ?

A. Moral evidence is that species of suasion that determines the mind in judging of all subjects that relate to moral conduct ; and also of all those facts, and general truths, which are ascertained by observation and experience.

In this logical sense, it comprehends all evidence which is not either *intuitive or demonstrative.*

Q. How is moral or probable evidence subdivided ?

A. Into *experience, analogy, and testimony ;* to which may be added, the light of revelation.

Every degree of evidence perceived by the mind, produces a proportional degree of assent or belief. " In most cases we measure the degrees of evidence by the effect they have upon a sound understanding, when comprehended clearly and without prejudice."—*Reid.*

Q. What is demonstrative evidence ?

A. It is that which results from the invariable properties and relations of things considered abstractly. Such are those immutable properties and relations which are the subjects of mathematical and metaphysical reasoning. The distinguishing nature of the evidence attending them, will be explained as we proceed.

Q. What divisions of reasoning are there, founded on this distinction of evidence ?

A. 1. *Moral or probable,* and 2. *Demonstrative reasoning.*

Principal differences between them.

Q. First—How do these kinds of reasoning differ in regard to their subjects ?

A. Demonstration is employed about abstract and independent truths; or the necessary relations of ideas.

The subjects of this reasoning, may not only be adequately conceived and accurately defined, but they are of a nature to afford general propositions of undoubted certainty; inasmuch as every conclusion is connected with first principles by an intuitive agreement, and follows *necessarily* from the premises.

But, " the subjects of moral reasoning, on the contrary, are matters of fact, which are in their nature contingent, and the variable connexions which subsist among things in actual existence." In reasoning on such subjects, from general principles; the premises are not intuitive truths, but are general propositions assumed on the ground of experience; also, the connexion between the premises and the conclusion is not *necessary*, nor absolutely certain, so as to render it impossible that the contrary should be true.

Q. What is a second difference in these two kinds of reasoning?

A. Demonstrative evidence admits of no degrees. Whatever is exhibited as demonstration, is either absolutely perfect, or it is mere illusion, destitute of all proof. But moral or probable reasoning has all degrees of proof. In this we ascend from bare possibility to probability, and thence, in the same manner, to the summit of moral certainty.

Thus, whether brutes reason? Whether temptation diminishes the turpitude of a crime? That mercury may be congealed by cold; that Julius Cæsar conquered Gaul, and the like; are subjects of moral reasoning, admitting different degrees of certainty or proof.

Q. What is a third difference?

A. In demonstration, one proof is as good as a thousand. When a proposition is once demonstrated, whatever may be offered as evidence on the opposite side, has no reality. But in moral reasoning, there are, in most cases, arguments of weight on both sides: hence, in order to judge correctly, we must balance the evidence on each side of the question, and give our assent according to the overplus of evidence which appears on the side that preponderates.

Thus, having demonstrated that the three angles of a triangle are equal to two right angles; to endeavour to prove the contrary, or to look for evidence on the opposite side, would be an absurdity.

But in questions of a moral nature, as, "whether it be lawful to take the life of another in self-defence;" or "to practise falsehood towards an assassin;" the mind is often held in suspense from the want of preponderating evidence on either side.

Q. What is a fourth difference?

A. In demonstration the proofs are framed into one coherent series, each part of which has an intuitive agreement with that which goes before it, and that which follows it. The whole chain has no greater strength than the weakest part, and yet the last link in the chain, if the whole be firm, has equal strength with the first. But moral reasoning is not a chain, but is in reality, a bundle of independent proofs. Such evidence has been compared to a rope, made up of many slender threads twisted together. The rope has strength more than sufficient to bear the stress laid upon it, though no one of the threads of which it is composed would be sufficient for that purpose. In moral reasoning, also, there is often a combination of many different topics of argument, no way dependent on one another. Each has some weight, and bestows on the conclusion a certain degree of probability, of all which accumulated, the credibility of the fact is compounded. —*Campbell.*

Ex. As examples of this kind, take the proofs of the being and attributes of God, as drawn from the works of nature: also the authenticity of Divine revelation, as evinced by the several evidences external and internal. So many and various are the proofs by which these truths are established, that the distinct consideration of them in each case, requires a volume; each separate argument produces conviction, and the whole of them collectively, forms an accumulation of evidence, which, to an honest mind, is conclusive and irresistible: yet he who rejects these truths, so firmly established, cannot be convicted of absurdity, as in the case of denying the truth of a mathematical demonstration, but is rather chargeable with irrationality and obstinacy.

Q. What is a fifth ground of difference in these two kinds of reasoning?

A. In moral reasoning there is no exact standard by which degrees of evidence can be measured; hence the mind is often unable to determine how near the evidence in a given case approaches to certainty, or how far it is deficient; consequently, what is admitted by one man as proof, may not be admitted by another; and especially if the admission of it should counteract his inclination, his interest, or his prejudices. But in mathematical reasoning, which is confined to number and magnitude, every thing is exact and certain. The several quantities, and their ratios to each other, are precise, and may be definitely expressed in propositions; and these propositions have an intuitive agreement with each other; it being the agreement of *identity* or *equality*, which relation pervades all mathematical reasoning, and is intuitively certain.— This simplicity in the evidence, and the uniform manner of proof, inferring every step according to some general axiom; render the demonstration equally certain and convincing to all who clearly comprehend it.*

Q. How is this difference evinced in matters of practice?

A. The truth of the foregoing remarks is confirmed by facts and daily experience. For example, we notice the exactness and certainty which attend the exchanging of money in the business of life; and also how perfectly mankind agree in estimating the quantities of things in the way of commerce, which are capable of exact measurement; while in matters of opinion respecting moral and political subjects, there are numberless discrepancies in sentiment, and opposite conclusions are formed and maintained in view of the same evidence.

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* In this account of the nature of demonstrative evidence, and of the distinguishing peculiarities of mathematical reasoning, the writer has adhered to the opinions of the most approved modern authors. He is aware, however, that Mr. Stewart has advanced a very different theory relative to this subject. (See Elem. chap. ii. sec. 3, 4.) According to his theory, the peculiar force and certainty attending mathematical reasoning, depend not on the nature of the evidence, but "on the circumstance of its principles being hypothetical. In mathematics, (he observes,) the propositions which we demonstrate, only assert a connexion between certain suppositions and certain consequences. And as our reasonings in this science are directed to this one object, to trace the consequences which necessarily follow from an assumed *hypothesis;* if, from this hypothesis, we reason with correctness, nothing, it is manifest, can be wanting to complete the evidence of the result." Whether this theory, which ascribes the clearness and cogency of mathematical demonstrations solely to the circumstance of their being founded in hypotheses, be correct or not, this consequence seems necessarily to result from the admission of it; that all those which are called *necessary truths,* "immutable, eternal verities," &c. will have less foundation in the nature of things, than even facts and contingent truths possess.

Q. What appears important to remark respecting the term, *probable evidence?*

A. The word *probable*, as applied to the evidence of moral reasoning, is not to be considered as implying a *deficiency* of proof in all cases, but rather a gradation from the lowest to the highest. In this logical sense it does not intimate so much the *degree* of evidence, as its *nature* and *kind*, in contradistinction to mathematical proof. This may be, and often is, proof complete in its kind. Moral certainty is absolute certainty in moral subjects, inasmuch as it admits of no additional evidence to render it complete. Probability is always susceptible of increase or decrease, whereas well grounded certainty is capable of neither. It is the deficiency of any *species* of proof which the nature of the case admits of, that renders the fact or doctrine to which it is wanting, barely probable.—*Kirwan's Logic*, No. 430.

SECTION FIFTH.

INDUCTION.

Q. What is the nature of induction?

A. The *method of induction*, so called, is a process by which we infer general truths from particular facts.

By generalizing the facts that have occurred to our observation, or have been disclosed to our experiments, we obtain conclusions respecting whole classes of beings; and in like manner, we establish other general principles from the uniform occurrence of individual cases that are similar.

Thus, the *laws of nature*, the maxims of experience, the rules of grammar, and the like; are traced from particulars to generals, and mean no more than the generalization of a fact.

Q. On what is the method of induction founded?

A. *It is founded on the belief, that things will happen in future as they have been known to happen in time past.* For this belief, which is common to all men; we can give no other reason, than that it is according to the constitution of human nature, or the appointment of God.

The laws of nature are modes of divine operation, and may be changed by him who established them. "But we are led by our constitution to rely upon their continuance, with as little doubt as if it was demonstrable." *Reid*, *Essay*, 8. ch. 3.

Q. How is our knowledge of the laws of nature obtained?

A. It is by noticing the succession of events, and by observing how they have been connected, as causes and effects; and from our experience that like events have happened in former times, in like circumstances, we are led to expect that they will happen in time to come, in like circumstances. "Facts, learned by experience and reduced to general rules, and the consequences of those general rules, are all that we really know of the material world." *Reid*, ibid.

Q. How is reasoning concerned in the inductive process?

A. In the inductive process, the principal exercise of reasoning consists in investigating and comparing the facts preparatory to the conclusion, rather than in inferring the general truth. "In drawing a general *physical* conclusion from particular facts, we are guided merely by our instinctive expectation of the continuance of the laws of nature; an expectation which, implying little if any exercise of the reasoning powers, operates alike on the philosopher and on the savage." *Stewart's Elem.* chap. 4. sec. 1.

Q. What is the nature of the evidence upon which inductive conclusions are founded?

A. We can discover no *necessary* connexion between any two events; we only see that they *are* so, not that they *must be* so. The only evidence we have of a permanent connexion between any events, or between any two qualities either of body or mind, is our having *invariably* found them conjoined in fact; and "this experience, in many cases, produces a conviction equal to that of demonstration." Thus, that fire burns; that water drowns; that bodies gravitate towards the earth; are general truths, uniformly experienced, and universally admitted. So we know, by experience, that certain leading properties exist together in the same species of bodies, and that certain moral and mental qualities usually accompany each other in the same persons.

Q. What is a general criterion in estimating the certainty of inductive conclusions?

A. General conclusions have, in most instances, a degree of probability, only in proportion to the extent of our experience, or to the number of particular facts on which they are grounded. Whenever human experience of facts has been uniform, and the number of cases examined sufficiently numerous, such conclusions will amount to moral certainty.

Thus, that all vegetables spring from seed; that all iron is susceptible of magnetic attraction; are truths that admit of no exceptions, as no contradictory instances have been discovered. Still, general maxims, grounded on experience, ought always to be so understood as to leave room for exceptions, if future experience shall discover any such." *Reid*, *Essay* 6, chap. 6.

Q. When will our deductions fall short of moral certainty?

A. When the facts experienced have not been uniform, nor sufficiently numerous, to justify a general conclusion. "This reasoning is liable to be fallacious, through impatience in the investigation, by which judgments are hastily formed without a sufficient accumulation of facts." *Hedge's Logic*, No. 101.

Q. How may the manner of investigating the laws of nature be described?

A. In establishing any general principle as a law of nature, the philosopher collects with care the phenomena that lead to the same conclusion, and compares them with those that seem to contradict or to limit it. And, after making experiments upon bodies in various situations, and applied to one another in various ways; if he observes the same property or the same effect to be the uniform result, without any contradictory instances; he is assured that such a property belongs to all bodies of that class, and that such events will always happen in like circumstances, as established laws of nature.

Again, in tracing events to their physical causes, he proceeds analytically: as, for instance, whenever an interesting *change* is preceded by a combination of different circumstances, by so varying his experiments as to leave out, one after another, these several circumstances, he carefully distinguishes those that are essential to the result from others that are only accidentally connected with it; and thus ascertains with what particular circumstances the effect is conjoined; or is enabled to connect the effect with its physical cause, as a general law of nature.

By such processes, he obtains general truths relating to the properties and laws of material objects.

Q. How do we, by the same inductive process, form general conclusions respecting human nature?

A. When, upon an acquaintance with mankind from history and observation, facts uniformly testify to their imperfection in judgment, and propensity to what is evil, so that no individual has yet been found to form an exception; by a plain induction we infer the general truths: *All* *men are liable to err—No man is wise at all times—All mankind are sinful.*

By the same process, we estimate the character of individual persons of our acquaintance; and our conclusions are likely to be more correct, in proportion as they are founded on a broader induction, comprehending a greater number and variety of particular actions.

Q. How does induction appear to coincide with classification, in proceeding from the less to the more general classes?

A. Thus: sometimes we deduce the common properties of a single class of beings, from observations on individuals of that class. So, from observations on a single species of birds, it is found that there are certain properties and peculiarities common to every individual of that species. Now, induction being a process from the several individuals to the whole, we can form as many general conclusions respecting any one class, as there are points or properties of resemblance in which all the individuals agree. Then, again, by comparing individuals of different classes, we discover important resemblances between one species and another, and are enabled to obtain more extensive conclusions. And again, after obtaining many subordinate conclusions respecting each separate species of birds, we ascend to those more general conclusions which are found to be true of all the species, and of the several individuals included under them; as, all birds are *two legged*, are *feathered*, are *winged*, are *oviparous*, and the like.

Q. In what kinds of investigation is the method of induction the most employed, and the most successful?

A. It is the most important instrument of reason, in establishing general principles, and in investigating general truths, except such as are strictly demonstrable. "No mathematical proposition can be proved by induction," nor will any abstract necessary proposition, capable of demonstrative proof, admit of proof from experience.—*Reid*, *Essay*, 6. chap. 6.

But all the general truths in natural science are ascertained by observation and experiment, which is the only successful method of philosophizing. It is by this inductive process that we arrive at all the general truths of *natural* philosophy and astronomy, of chemistry and medicine; and, by the same method, we gain those practical rules and maxims, by which the common business of life is regulated.

Q. What may be remarked respecting the different classes of natural existences?

A. In the animal and vegetable kingdoms, where the several species are more distinct and uniform, (*each producing after its kind,*) from a knowledge of a few individuals we are able to form general conclusions respecting the whole species. But in deducing the properties and effects of natural substances, which are unorganized bodies, the principal difficulties arise from their being mostly of a compound nature, and therefore not easily reducible to species. On a narrower scrutiny we find, that the effects ascribed to them in the compound, ought often solely to be ascribed to one or more of the component parts; and that the other parts no way contribute to the production, but, on the contrary, they sometimes tend to hinder it. Yet, in judging concerning the properties and effects of simple substances, and elementary natures, a general inference may be drawn from a small number of particular cases.

Ex. Thus, if aqua fortis has been found to dissolve silver in one instance, the presumption is very strong that it will do so in all. Again: fire consumes wood; melts copper; hardens clay; in these, and many more instances, it acts uniformly. If then, we try the influence of fire upon any fossil, or other substance, and find that such is the effect in one instance; we readily conclude that it will always produce a similar effect upon similar bodies.

Q. What constitutes the important difference between syllogism and induction?

A. Syllogism and induction are processes directly opposite to each other. As induction begins with individual objects, and ascends by successive steps to the most general truths; so syllogism, on the contrary, commences with some universal proposition, and descends to the less general classes; inferring concerning the species what is true of its genus, and again of the individual what is true of its species.

Q. How does the evidence upon which inductive conclusions are founded, differ from that which attends self-evident and demonstrable truths?

A. The strength of most inductive conclusions, is in proportion to the number of facts upon which they are grounded ; hence, they admit of a continual increase of evidence, inasmuch as every new instance of the same kind, adds one to the number of the proofs.

But a general principle, which is either self-evident or demonstrable, when once perceived to be true by a clear discernment of its evidence ; is seen to be necessarily true in all possible cases.

So when we conceive, how *two parallel lines ever so far produced can never meet ;* a clear discernment of this truth in a single instance, produces the fullest conviction, that the same must be universally and immutably true.

Q. In what manner is syllogistic reasoning dependent on induction ?

A. In all reasoning, except that which is strictly demonstrative ; in so far as we employ syllogism, we are indebted to induction for those general principles which we assume as the premises. From these general principles, the province of syllogism is, to follow back the footsteps of the inductive processes to particular and individual conclusions ; and also, to deduce other truths as consequences from them, or as resulting from their conformity or contrariety to them ; as has been explained under section second.

Q. What is the nature of that kind of induction which draws general conclusions from particular premises ?

A. This is a mode of reasoning in which we infer universally concerning any whole, what we had before affirmed or denied separately respecting all its parts.

The truth of such general conclusions, depends upon a complete enumeration of the several parts into which the whole subject is resolvable.

We shall have an example of this kind of induction ; if we suppose the whole tribe of animals to be subdivided into *men*, *beasts*, *birds*, *insects*, *and fishes ;* and then reason concerning them after the following manner :

All men have a power of beginning motion :
All beasts have a power of beginning motion :
All birds, insects, and fishes, have a power of beginning motion ;
Therefore all animals have a power of beginning motion.

Obs. 1. "Inductions of this sort are of frequent use in mathematical demonstrations, in which, after enumerating all the possible cases, it is proved that the proposition in question, is true of each of these considered separately; and the general conclusion is thence drawn that the theorem holds universally. Thus, if it were shown that, in all right angled triangles, the three angles are equal to two right angles, and that the same thing is true in all acute angled, and also in all obtuse angled triangles; it would necessarily follow, that in *every* triangle the three angles are equal to two right angles; these three cases manifestly exhausting all the possible varieties of which the hypothesis is susceptible."

Q. What may be further remarked respecting this kind of induction?

A. This kind of induction was taught by Aristotle, and has obtained a place in most of the former systems of logic; but it is of little importance, when compared with the induction of Bacon, which is employed as the chief instrument of reason in investigating the general truths of philosophy. To this *method of induction*, it bears no resemblance, except in its being a process from particulars to generals. As to the nature of its evidence, and the force of its conclusions, it rests on the same principle with the syllogism, only inverted, viz.: that *what may be affirmed of all the species of any genus, may be affirmed of the whole genus.*—*Stew. Elem.* chap. 4. sec. 2.

Q. In what other reasonings is this kind of induction employed?

A. It deserves to be noticed, that in many argumentative discourses, the method of reasoning pursued, is of this kind; and is called *an induction of particulars.*

This is the case when the general proposition, or doctrine to be established, is first proved to be true of the several parts which compose the subject; and after it has been shown that all the particulars result in the same general conclusion, the doctrinal proposition is considered as fully established.

SECTION SIXTH.

ANALOGY.

Q. What is Analogical Reasoning ?

A. When from facts already experienced, we infer facts of a similar kind not experienced, from the resemblance of the two cases ; this is called analogical reasoning.

Q. On what general principle are analogical conclusions founded ?

A. On this principle, *that nature is consistent and uniform in her operations, so that from similar circumstances, similar effects may be expected.*

Q. How is the force of an argument from analogy to be estimated ?

A. The force of analogical conclusions, is in proportion to the resemblance between the two cases, viz. ; *that from which we argue*, and *that to which we argue.* For example ; we think it probable that the planets are inhabited, they being in all respects so like our earth. The case from which we argue is the circumstance of this earth's being a planet warmed and enlightened by the sun, and inhabited by many varieties of living creatures : and the case to which we argue, is that of the other planets and their degrees of similarity to our earth. Now, in proportion as the other planets are known to resemble our earth in their relations to the sun, in "*their having fields, and seas, and skies of their own*, and being furnished with all the accommodations for animal subsistence," in like proportion is the probability that they are inhabited.

Q. If we conclude from analogy that the fixed stars are so many suns, why is this conclusion less probable ?

A. Because we know less of the resemblance between them and our sun, than of that between the other planets and our earth. All conclusions from analogy are weakened in proportion as they are founded on a more remote resemblance.

Q. What are some of the circumstances that mark a distinction between inductive and analogical reasoning ?

A. Induction is a process from several individuals of a class to the whole ; hence, its conclusions are always general. In this process, we have *direct* evidence, from experience, that the property we ascribe to the whole class, exists in many individuals of that class ; but with regard to the remaining objects of the class, concerning which we must necessarily judge without examination ; the conclusions must rest on the ground of analogy.—*Hedge.*

But in analogical reasoning, in which we argue either from one individual to another of the same class, or from one species to another ; no *direct* evidence is afforded, that the same property exists in the two subjects or classes.

Q. How may this distinction be farther illustrated by example ?

A. Thus, the circulation of the blood in the human body, has been ascertained by experiments upon many individuals ; hence we infer the general conclusion by *induction*, that the blood circulates in every human body. But if, from the great similarity which other animal bodies bear to the human body, we infer the circulation of the blood in brutes, this is an argument from *analogy*. Should we farther infer the circulation of sap in vegetables, barely from the circulation of the blood in the human system, this conclusion from *analogy* would be less probable than the former, it being founded on a more remote resemblance.

Q. What may be remarked in general respecting analogy ?

A. It is the weakest of all the kinds of evidence, being wholly *indirect and collateral*, " and is hardly ever honoured with the name of proof."—*Campbell's Rhetoric.*

When things resemble each other in some important circumstances, we are apt to suppose the similitude more extensive than it really is : also, many arguments from analogy are grounded on a few points of resemblance only, while the many points of difference between the two cases which would militate against the conclusion, are left out of view through inadvertence, or are sophistically disguised.

Q. In what kind of discussions is analogical reasoning the most prevalent ?

A. It is in political discussions, where analogy is almost the only evidence that can be employed. The ground of argumentation here, is chiefly, the resemblance between different nations, their respective governments, their institutions and customs, their resources and local circumstances ; from which the present or the future is inferred, from what has already been in time past. Such conclusions should seldom be admitted without some degree of distrust, as they are often hasty and weak, being founded on a slight resemblance.

Q. What one exception to this general remark is important to notice?

A. So far as political conclusions are founded on past *experience*, and the cases are *similar*, the evidence is *direct*, and the conclusions may be called inductive. Such are the conclusions respecting the future conduct of men; deduced from the general sameness of human nature, in all ages and nations.

On this fact, the general principles of *political science*, which are the result of experience, rest, as on a firm foundation. So the doctrines and maxims contained in Aristotle's system of politics, after a lapse of three thousand years, are for the most part applicable in all civilized nations at the present day; and this system is still considered by the statesman, as the great depository of political wisdom.

" There is another class of principles from which political conclusions have sometimes been deduced, and which notwithstanding the common prejudice against them, are a much surer foundation for our reasonings, than those which are deduced from a few examples of particular governments. I allude, at present, to those principles which we obtain from an examination of the human constitution, and of the general laws that regulate human affairs; principles, that are certainly the result of a much more extensive induction, than any of the inferences that can be drawn from the history of actual establishments."—*Stew. Elem.* chap. 4. sec. 8.

" By a knowledge of the tempers of men and their present circumstances," says Dr. Watts, " we may be able to give a happy guess what their conduct will be, and what will be the event, by an observation of the like cases in former times." This led the Emperor Marcus Antoninus to remark, " by looking back into history and considering the fate and revolutions of governments, you will be able to form a guess, and almost prophecy upon the future.—For things past, present, and to come, are strangely uniform, and of a colour; and are commonly cast in the same mould. So that upon the matter, forty years of human life, may serve for a sample of ten thousand."—*Watts' Logic*, page 277.

SECTION SEVENTH.

REASONING ON FACTS.

Q. For the knowledge of what facts must we rely on the testimony of others ?

A. For the knowledge of such facts as have not fallen under our own immediate observation.

Q. Of the facts that are investigated and admitted on the ground of human testimony, which is one very important class ?

A. All human actions considered as already past are of this nature, since they form the chief subjects of history, as well as of moral and judicial investigation. These, and all other past occurrences, having now no longer any existence, both the facts themselves and the circumstances attending them, can be known only from the testimony of such persons as had sufficient opportunities of ascertaining their reality.

Q. By what principle are we led to accredit human testimony ?

A. By an original principle of our nature, we are led to give an unlimited assent to human testimony, when we have no positive reasons of mistrust or doubt."—*Campbell.* Some ascribe this to " *the principle of veracity*, as an original faculty in man."* Others trace it to " the consciousness we have of a regard to veracity existing in ourselves.†"

Q. What proof have we of the fact, that there is a native propensity in the human mind to believe what others assert ?

A. Children at first believe every thing that is told them, and do not suspect any disposition to falsehood in others, until they see them practise it. This disposition to unlimited belief continues, till experience teaches the necessity of restraining our confidence in testimony within the proper limits.

Q. What considerations justify our general belief in testimony ?

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* *Reid.*

† *Scott's Elem.* chap. 8, sec. 3.

A. Such as these, that it is natural and easy for any one to speak as he thinks. It requires no invention nor study to relate things as they are. But, " acts of deception require study, and are seldom practised but for criminal purposes." So natural is the disposition to truth, that there are few who may not be credited in common cases, where no motive of deviating from it appears.

Q. What are the qualifications which constitute what is called the credibility of a witness ?

A. First—*sufficient knowledge, opportunity, and attention* to ascertain the reality of the fact attested. Secondly—*disinterestedness*, or a freedom from partiality and undue bias, arising from fear of detriment or hope of advantage. Thirdly—*integrity*. This quality affords the firmest assurance of a true testimony, in all matters of importance, as it is inconsistent with the influence of any undue motives, as well as with a conscious ignorance of the fact attested. Lastly—*veracity*, or an experienced disposition to a strict adherence to truth. The obvious defect of these qualifications in a witness renders him *incompetent* in legal cases : and these, where they exist, are usually fortified in juridical proceedings by the sanction of an oath, with the knowledge of its nature, and of the fearful consequences of perjury."—*Kirwan*, chap. 4. sec. 2.

Q. When is testimony called *direct*, *incidental*, or *traditional ?*

A. That which is professedly given on a certain subject is called *direct testimony*. But a declaration uttered in conversation, or accidentally made in a discourse, when applied as evidence on a different subject, and for a different purpose from what it was originally intended, is termed *incidental testimony*. When a witness asserts a fact which he learned from the mouth of some other person, his testimony is styled *traditional*.

Q. What is the general principle in regard to traditional testimony ?

A. The further it is transmitted from its original source, the weaker it becomes. This holds universally true, except in cases where other original witnesses more than the first, appear, to corroborate the testimony.

Written testimony is usually esteemed stronger, and more deserving of confidence than oral ; as it involves less suspicion, arising from the imperfection of memory, and from probable alteration in the circumstances of the attested fact.

Q. When several independent original witnesses testify to the same fact, what is the natural effect ?

A. When with equal advantages for knowing the fact which they assert, and without any previous concert, they all agree in their report; they naturally strengthen each other's testimony. Thus, the testimonies of the four evangelists, all harmonizing in regard to the important facts which they relate, while the minor discrepancies are just sufficient to forbid the idea of concert; afford the most satisfactory proof of the truth of their narrations. No adequate cause can be assigned for such a concurrence, other than the existence of the facts to which they bear testimony.

Q. What is presumptive evidence ?

A. Presumptive evidence is that which is only circumstantial, and is more or less strong according as the circumstances of the case more or less clearly indicate the fact. The belief grounded on such evidence is termed presumption.

Thus, that a person is the author of a book, merely because the style and manner resemble his, affords a presumption that is *slight*: but if it be known withal, that he had been preparing a similar work for publication: this additional circumstance will render the presumption strong or *violent*.

Q. What sort of proof is furnished by circumstantial evidence ?

A. The popular maxim, " That circumstantial evidence falls short of positive proof," is not true (says Dr. Paley) in the unqualified sense in which it is applied. " A concurrence of well authenticated circumstances composes a stronger ground of assurance, than positive testimony unconfirmed by circumstances, usually affords. Circumstances cannot lie. The conclusion also which results from them, though deduced only by probable inference, is commonly more to be relied upon than the veracity of an unsupported solitary witness."—Book 6. chap. 9.

Q. When are facts said to possess internal evidence, or internal probability ?

A. When they are such as accord with our general experience in similar cases: or with what we might rationally expect to happen in such circumstances. Such facts are sometimes admitted upon their own internal probability, aside from the evidence of testimony: as, if it were asserted, that the snow in Canada the last winter was four feet deep. Others have their probability increased by testimony: as, that the citizens of New-York passed over the North River on the ice for several days successively.

Q. What is required when the internal probability is less?

A. In this case more testimony is required to produce belief: as, if it were asserted that it rained every day during a fortnight.

Q. What facts are judged of exclusively on the ground of testimony?

A. Those which are called *indifferent or equicasual*; as, whether last Christmas day was clear or cloudy at such a place. Or whether a man has made a will or died intestate. The probability of such facts when asserted, is just equal to the credibility of the attesting witness.

Q. When may facts be said to take place aside from our experience, and yet not contrary to it?

A. When they are such as rarely occur, and yet are always possible; as if it were asserted that a person was drowned crossing a certain ferry; an instance of which had not been known for fifty years. Here the unfrequency of the fact, and its varying from our uniform experience in this particular case, does not lessen its probability; and in yielding our assent to its truth, when properly attested, we are not restrained by any previous experience.

Q. What may be given as a general criterion in judging of all attested facts?

A. "The probability of an attested fact or testimony, is directly as its internal probability, and the credibility of the person who attests it."—*Kirwan's Logic*, No. 464.

These two circumstances duly ascertained, will, in all cases, suggest the true grounds of a correct decision.

Q. If the fact asserted be of an extraordinary or a marvellous kind, what degree of evidence is sufficient to command belief?

A. As marvellous facts are such, merely because they are unsupported by any previous experience, they may be said to militate against general experience in similar cases; hence, they are assented to with difficulty. The internal *improbability* of such facts must be overcome by an increased weight of testimony. The case may be thus stated : experience says, *this has rarely happened ;* testimony asserts, *this has lately happened.* The testimony then, only adds one more to the number of instances.—When therefore the testimony is *complete*, it amounts to full proof.—*Kirwan*, No. 359.

Q. How are miraculous events to be judged of?

A. Miraculous events being contradictory to general and uniform experience in similar cases ; are in themselves, in the highest degree improbable, when contemplated merely as the effects of a power ordinarily operating in corporeal nature.

But since miracles when actually wrought, are effected by Divine power signally exerted for this purpose ; their improbability is removed whenever there is a sufficient cause to require or justify such a Divine interposition. Did infidels acknowledge this obvious distinction between miracles and other events, they must admit that the former are capable of proof from human testimony, equally with the latter. Thus, *to raise the dead to life ; to cure blindness with a touch ; to create loaves and fishes ;* or *to calm the winds and waves by a word*, are miracles ; but to Divine power, are as easy as to endow an embryo with a soul, or to cause vegetation to revive in the spring. Hence, there is no presumption against miracles being wrought ; whenever any very important occasion renders it fit that the Divine power should be exerted for this purpose

Q. What evidence is sufficient to establish the truth of miracles ?

A. Miracles admit of proof from human testimony, when attested by a number of credible witnesses who possess the means of obtaining a clear knowledge of the facts. Even were it true, that "they require for their belief, a testimony so ample, and attended by such circumstances, as would render its falsehood no less miraculous than the fact attested ;" yet, by such a testimony the miracles recorded in the scriptures are confirmed.

CHAPTER SECOND.

VARIOUS KINDS OF SYLLOGISMS.

SECTION FIRST.

OF SINGLE SYLLOGISMS AND THEIR RULES.

Q. What is the most general division of Syllogisms ?

A. Into single and compound.

Q. What constitutes the difference between them ?

A. A single, or simple syllogism, consists of only three propositions, the major, the minor, and the conclusion.

Compound syllogisms are such as contain more than three propositions, and may be resolved into two or more syllogisms.

Q. What are the peculiar properties of single or categorical syllogisms ?

A. They are syllogisms made up of three simple or categorical propositions; in which the middle term is regularly joined with one part of the question in the major proposition, and with the other in the minor, whence there follows a plain single conclusion : as,

Every virtue is to be habitually practised :
Prudence is a virtue ;
Therefore prudence is to be habitually practised.

Q. What axioms are there relative to Simple Syllogisms ?

A. There are four *general axioms* upon which the *rules* pertaining to simple syllogisms are founded ; these are the following.

AXIOM I.

Particular propositions are contained in universals, and may be inferred from them ; but universals are not contained in particulars, nor can be inferred from them.

AXIOM II.

In all universal propositions the subject is universal: in all particular propositions the subject is particular.

AXIOM III.

In all affirmative propositions the predicate has no greater extension than the subject; for its extension is restrained by the subject. Hence the predicate, although it is usually a genus, is affirmed of a species or of an individual in the same limited extension: as, *quadrupeds are animals; a dog is an animal.*

AXIOM IV.

The predicate of a negative proposition is always taken universally, for in its whole extension it is denied of the subject. Thus, if we say, *no stone is vegetable,* we deny all sorts of *vegetation* concerning *stones.—Watts' Logic,* part 3. chap. 2. sec. 2.

Q. What are the rules of *simple regular* syllogisms?

A. These rules, as they are found in most books of logic, are the following:

RULE I.

The middle term must not be taken twice particularly, but once at least universally; also, it should have the same sense or signification in each of the premises; otherwise there will be *four distinct terms* in the syllogism, in which case, the subject of the conclusion is compared with one middle term, and the predicate with another, and this will never show whether that subject and predicate agree or disagree.

RULE II.

The terms in the conclusion must never be taken more universally than they are in the premises. Because *generals cannot be inferred from particulars,* according to the first axiom.

RULE III.

A negative conclusion cannot be proved by two affirmative premises. For when the two terms of the conclusion agree with the middle term, (as is here supposed,) it can by no means follow that they disagree with one another.

RULE IV.

If one of the premises be negative, the conclusion must be negative. For if the middle term be denied of either part of the conclusion, it may show that the terms of the conclusion disagree, but it can never show that they agree.

RULE V.

If either of the premises be particular, the conclusion must be particular; otherwise, the more general would be inferred from the less general, contrary to axiom first.

RULE VI.

From two negative premises nothing can be concluded; for they separate the middle term from both the subject and predicate of the conclusion, and thus preclude any comparison or inference.

RULE VII.

From two particular premises nothing can be concluded; for a particular is not contained in a particular, and cannot be inferred from it, according to the first axiom.

Q. What is the fourfold division of syllogisms?

A. They are divided according to their different conclusion, into *universal affirmative*, *universal negative*, *particular affirmative*, and *particular negative*.

Examples exhibiting these four different kinds of conclusions are those in the following section, under the first *Figure of Syllogisms.*

SECTION SECOND.

MODES AND FIGURES OF SYLLOGISMS.

Q. What is the foundation of the different figures of syllogisms?

A. It is the particular situation of the middle term, with respect to the major and minor terms, that constitutes the different figures. As the middle term enters into both the premises, it may receive four different positions in relation to the extremes; hence result four different figures.

Q. How are these figures distinguished?

A. In the first figure, the middle term is the subject of the major proposition, and the predicate of the minor.

In the second figure, it is the predicate of both the premises.

In the third figure, it is the subject of both the premises.

The fourth figure requires the middle term to be the predicate of the major premise, and the subject of the minor. But this is a very indirect manner of concluding, and is never used in the sciences; it is therefore considered useless.

Q. What is meant by mode in syllogisms?

A. "By the mode of a syllogism is meant the designation of the quantity and quality of its propositions."

Thus, in the first figure, the syllogisms are so varied in the quantity and quality of their propositions, and in the order of them, as to afford four different kinds of conclusions, viz.: universal and particular, affirmative and negative; and consequently four different modes.

The following are examples:

Ex. I.

Every vegetable springs from seed:
All trees are *vegetables;*
Therefore all trees spring from seed.

Ex. II.

They who *subvert the foundations of religion and morality,* are not friends to human happiness:
Atheists *subvert the foundations of religion and morality;*
Therefore Atheists are not friends to human happiness.

Ex. III.

Whoever *attempts to destroy the life of another unjustly*, is guilty of murder:

Some have saved the lives of others *in attempting to take their lives unjustly*;

Therefore some who have saved the lives of others, are guilty of murder.

Ex. IV.

Nothing *performed with a bad intention* is virtuous:

Some actions greatly beneficial are *performed with bad intentions*;

Therefore some actions, greatly beneficial, are not virtuous.

Q. How many modes are contained in the second figure?

A. It contains four modes, two of which only we shall exemplify here, leaving the reader to supply the others.

Ex. I.

No liar is *fit to be believed:*

Every good man is *fit to be believed;*

Therefore no good man is a liar.

Ex. II.

Every man of strict honour *would disdain to enrich himself at his neighbour's expense:*

No gamester [illegible]*ains to enrich himself at his neighbour's expense;*

Therefore no gamester is a man of strict honour.

Here the second mode differs from the first, only, in its having the affirmative proposition first, and the negative second.

Q. How many modes belong to the third figure?

A. The third figure has six modes, and admits only of particular conclusions; as,

Ex. I.

All true Christians shall be saved:

All true Christians have sinned;

Therefore some who have sinned shall be saved.

Ex. II.

No hypocrites are pleasing to God:

All hypocrites seem to be religious;

Therefore some who seem to be religious are not pleasing to God.

Obs. In the ancient books of logic, the fourth figure contained five modes, making in all nineteen conclusive modes. Of the remaining ones no explanation will here be given.

SECTION THIRD.

CONDITIONAL AND DISJUNCTIVE SYLLOGISMS.

Q. What is a conditional or hypothetical syllogism?

A. It is a syllogism of which the major is a conditional proposition: as,

If there be a God, he ought to be worshipped:
But there is a God;
Therefore he ought to be worshipped.

And here we are to observe, that all conditional propositions are made up of two distinct parts called the antecedent and consequent: the former expressing the condition upon which the predicate agrees or disagrees with the subject, the latter joining or disjoining the said predicate and subject as in the above example.

Q. What is the ground of inference in conditional syllogisms?

A. In all propositions of this kind, the antecedent must always contain some certain and genuine condition, which necessarily implies the consequent; for otherwise the proposition itself will be false, and therefore ought not to be admitted into our reasonings.

Q. Hence what follows?

A. It follows, that when any conditional proposition is assumed, if we admit the antecedent of that proposition, we must at the same time necessarily admit the consequent; but that, if we reject the consequent, we must in like manner, necessarily reject the antecedent.

Q. What two ways of arguing are there in conditional syllogisms, which lead to certain and unavoidable conclusions?

A. The first is, *from the admission of the antecedent to the admission of the consequent.* Thus, in the syllogism given above, if we admit that *there is a God*, we must also admit, *that he must be worshipped.* This mode of conditional syllogisms, in which we argue from the admission of the antecedent to the admission of the consequent, is distinguished in the schools by the name of the *modus ponens;*

inasmuch as by it, the whole conditional proposition is established.

Or, secondly, thus:

If God is infinitely wise, and acts with perfect freedom, he does nothing but what is best:
But God is infinitely wise, and acts with perfect freedom;
Therefore he does nothing but what is best.

Here we see, the antecedent is established in the minor, and the consequent in the conclusion, whence the syllogism itself is an example of the modus ponens.

Q. What is the second mode or species of conditional syllogisms?

It is the arguing *from the removal of the consequent to the removal of the antecedent*, and is called by logicians the *modus tollens*, because by it, both antecedent and consequent are rejected, as appears by the following example.

Thus,

If the sun be risen, the night is past:
But the night is not past;
Therefore the sun is not risen.

These are the only two modes of reasoning in this sort of syllogism that lead to legitimate conclusions; for we are not at liberty to adopt the contrary course, and argue from the removal of the antecedent to the removal of the consequent; nor from the admission of the consequent to the admission of the antecedent. This will be manifest from the following examples.

Ex. I.

If a minister were a prince he must be honoured:
But a minister is not a prince;
Therefore he must not be honoured.

Ex. II.

If a minister were a prince he must be honoured:
But a minister must be honoured;
Therefore he is a prince.

Q. Why must all conclusions thus inferred be false?

A. Because the falsehood of the consequent will not follow from the falsehood of the antecedent; nor the truth of the antecedent, from the truth of the consequent.

The one may be true, and the other may be false, for reasons different from those which are assigned in the suppositions.—*Hedge*, *Log.* No. 179.

So a minister may be entitled to honour if he is not a prince, nor does his being entitled to honour make him a prince.

Q. What is a *Disjunctive Syllogism ?*

A. It is a syllogism of which the major is a disjunctive proposition ; as in the following example.

> The world is either self-existent, or the work of some finite, or of some infinite being:
> But it is not self-existent, nor the work of a finite being ;
> Therefore it is the work of an infinite Being.

Q. What is the manner of arguing in disjunctive syllogisms ?

A. In a disjunctive syllogism, of several predicates enumerated in the major, we affirm one necessarily to belong to the subject, to the exclusion of all the rest, but leave that particular one undetermined. If then the *minor* establishes one of these predicates, the conclusion must remove all the rest ; or if in the minor premise, all the predicates but one are removed, the conclusion must necessarily establish that one.

Thus, in the example given above, the major affirms one of three predicates to belong to the world ; two of these are removed in the minor, viz. : *self existence* and *the work of a finite being*. Hence, the conclusion determines the third predicate to belong to the subject, and affirms that it is *the work of an infinite Being.*

Q. What is the other mode of inferring the same conclusion ?

A. If on the contrary, one of the predicates be first established in the minor, by affirming the world to be the *production of an infinite being ;* then the conclusion must remove the other two, by asserting it to be neither *self-existent*, nor the work of *a finite being.*

Obs. As disjunctive syllogisms are used chiefly in cases of indirect reasoning, the natural mode of arguing is from the removal of all the predicates but one, to the establishing of that one ; and the reasoning consists in shewing the falsehood or absurdity of the suppositions which are removed in the minor.

SECTION FOURTH.

ENTHYMEMES.

Q. What is an enthymeme ?

A. "It is an abridged, or defective syllogism, consisting of the conclusion and only one of the premises ; the other being suppressed, as sufficiently obvious without insertion."

Thus,

Every man is mortal ;
Therefore every king is mortal.

Here the *minor* (every king is a man.) is suppressed ; let this be inserted, and the syllogism will be complete.

Q. What is another form of enthymeme ?

A. It is when the sign of reasoning is prefixed to the first, or reasoning proposition, and not to the conclusion ; as,

Since, (or as) God is our Creator ;
He must be worshipped.

Q. What is a third form, termed the causal enthymeme ?

A. It is that, in which the reasoning proposition, with the sign of reasoning prefixed to it, follows the conclusion.

Thus,

God must be worshipped ;
Because he is our Creator.

This last is the form of enthymeme most common in familiar conversation, viz. expressing the conclusion first, and then subjoining the reason on which it is grounded, with the causal particle before it.

Q. How may it be known which of the premises is in any instance omitted ?

A. If the subject of the conclusion be expressed in the reasoning proposition. the major premise is omitted ; if the predicate of the conclusion be expressed in the given proposition, the minor premise is wanting.

Thus,

Whatever destroys health should be avoided ;
Therefore intemperance should be avoided.

Here the minor is omitted, viz. *intemperance destroys health.*

Another example.

Religion is necessary to salvation ;
Therefore religion should be immediately sought.

In this, the major is omitted ; which, when supplied, will complete the syllogism.

Thus,

Whatever is necessary to salvation should be immediately sought :
Religion is necessary to salvation ;
Therefore religion should be immediately sought.

Q. What may be remarked respecting enthymemes?

A. " Each regular enthymeme contains the elements of a syllogism, namely : the major, minor, and middle terms ;" and may be easily converted into a syllogism, by supplying the suppressed proposition. Most acts of familiar reasoning are expressed in enthymemes, in which the judgment is formed by a comparison of the same things as in the syllogism, with this advantage, that the omission of one proposition pays a compliment to the understanding of others, expedites the reasoning process, and contributes to the elegance of language.

SECTION FIFTH.

COMPOUND SYLLOGISMS.

Q. What are the names of the principal Compound Syllogisms?

A. They are the *Epichirema*, *Sorites*, and *Dilemma*.

Q. What is the nature of the Epichirema?

A. It is a syllogism, in which we prove the major, or the minor, or both, before we draw the conclusion; as,

> Sickness may be good for us; *because it brings us to consider our ways:*
>
> But we are uneasy under sickness; *as appears by our sighs, groans, and complaints;*
>
> Therefore we are sometimes uneasy, under what is good for us.

Here "the major and minor premises, with their respective proofs form two enthymemes, which may readily be reduced to regular syllogisms." The epichirema becomes a regular syllogism by omitting the proofs, as may be seen in the above example.

Q. What may be remarked respecting the epichirema?

A. This is often used in writing, in public speeches, and in argumentative treatises. Sometimes a syllogism is first propounded, embracing the scope of the reasoning, and then the major and minor premises are separately proved by a variety of arguments, previous to establishing the conclusion; at other times, the major is first advanced and proved, then the minor in like manner, upon which they are brought together, and thence the conclusion is deduced.

Q. What particular instance of this kind may be cited?

A. Cicero's defence of Milo is an argument of this sort. His major proposition is, *that it is lawful for one man to kill another who lies in wait to kill him*, which he proves from the custom of nations, from natural equity and the like; the minor is, that *Clodius lay in wait for Milo, with a murderous intent;* which he proves by his arms, guards, &c.; and he then infers the conclusion, *that it was lawful for Milo to kill Clodius.—Watts' Logic*, part 3. chap. 2. sec. 6.

SECTION SIXTH.

SORITES.

Q. What is a Sorites?

A. This is a mode of arguing in which several propositions are so linked together, that the predicate of one becomes continually the subject of the next following; until at last a conclusion is formed, by bringing together the subject of the first proposition, and the predicate of the last; as in the following example.

There can be no enjoyment of property without government;
No government without a magistrate;
No magistrate without obedience;
And no obedience, where every one acts as he pleases;
Therefore there can be no enjoyment of property, where every one acts as he pleases.

Q. How does the Socratic manner of reasoning resemble this?

A. It proceeds, in like manner, by a series of connected propositions, only it arrives at the conclusion by interrogation, and concession on the part of the opponent, instead of direct affirmation.

Obs. This particular combination of propositions may be continued to any length we please, without in the least weakening the ground upon which the conclusion rests.—The reason is, because the sorites itself may be resolved into as many simple syllogisms, as there are middle terms n it; or as it has propositions intervening between the first and the last; and is indeed no other than a compendious way of reasoning syllogistically.

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* Themistocles, it is said, used sometimes in the way of pleasantry, to employ this form of reasoning in reference to his son, who was then a child.

My son governs his mother:
His mother governs me:
I govern Athens:
Athens governs Greece:
Greece governs the world:
Therefore my son governs the world.

A SORITES OF HYPOTHETICAL SYLLOGISMS.

Q. How may a sorites be formed when the propositions are conditional?

A. Any number of them may be so joined together in a series that the consequent of one shall become continually the antecedent of the next following: in which case, by establishing the antecedent of the first proposition, we establish the consequent of the last, or by removing the last consequent, remove also the first antecedent.

This way of reasoning is thus exemplified:

> If we love any person, all emotions of hatred towards him cease
> If all emotions of hatred towards a person cease, we cannot rejoice at his misfortunes:
> If we rejoice not at his misfortunes, we certainly wish him no injury;
> Therefore if we love a person, we wish him no injury.

It is evident that this sorites as well as the last, may be resolved into a series of distinct syllogisms, with this difference only, that here the syllogisms are all conditional.

SECTION SEVENTH.

DILEMMA.

Q. What is a Dilemma?

A. A dilemma is an argument, by which we endeavour to prove the absurdity, or falsehood, of some asserted proposition.

In order to this we assume a conditional proposition, the antecedent of which is the assertion to be disproved, and the consequent a disjunctive proposition enumerating all the suppositions upon which that assertion can take place.

Q. What is the mode of inferring the conclusion?

A. If then it appears, that all these suppositions ought to be rejected, it is plain that the antecedent, or assertion itself, must be so too: which is arguing from the removal of the consequent, to the removal of the antecedent.

Q. How does this argument proceed?

A. When such a conditional proposition is made the *major* of any syllogism, if the *minor* rejects all the suppositions contained in the consequent, it follows necessarily, that the conclusion must reject the antecedent; which as before observed, is the assertion to be disproved. This will appear in the following example.

> If God did not create the world perfect in its kind; it must have proceeded, either from want of inclination, or want of power:
> But it could not have proceeded, either from want of inclination, or want of power;
> Therefore it is absurd to say, that God did not create the world perfect in its kind.

Obs. In a dilemma therefore, the major is always a conditional proposition, whose consequent contains all the several suppositions upon which the antecedent can take place. As therefore these suppositions are wholly removed in the *minor*, the antecedent, or assertion to be disproved must, it is evident, be rejected in the conclusion.

Q. What may be remarked respecting the dilemma?

A. It is a form of argument frequently employed both in moral and mathematical reasoning.

In the former, it is a most successful instrument for refuting the assertion of an opponent, and for reducing him to an absurdity, whence he has no room to escape.—Euclid frequently when about to shew the equality of two given figures, makes use of the dilemma, and proves the absurdity of asserting them unequal. In order to this he assumes, *that if the one is not equal to the other, it must be either greater or less*, and having removed both these suppositions, on which alone the assertion can stand; he thence infers demonstrably, that the proposed figures are equal.

Q. What may serve as an example of this in moral reasoning?

A. The following dilemma was once used to prove the misery of human life.

> In this life we must either obey our vicious inclinations, or resist them;
> To obey them will bring sin and sorrow, to resist them is laborious and painful;
> Therefore we cannot be free from sorrow or pain in this life.

Q. In what two ways may a dilemma be defective?

A. *First*—when the disjunctive proposition does not enumerate all the suppositions, upon which the antecedent can take place, for then the major is false.

Secondly—when all the suppositions are not removed or refuted in the minor, which occasions it also to be false.

The following example is defective in both the major and the minor.

> A wife is either beautiful, or she is deformed:
> If beautiful, then she will make her husband jealous; if deformed then she will disgust him;
> Therefore a man should take no wife.

Here it is plain, that there is a medium between beauty and deformity, which is omitted in the major; and also that women may be beautiful, and yet so modest as to afford no just cause for jealousy; whence the minor is not true.

Obs. When the consequent of the major consists of three members, it is called a trilemma.

SECTION EIGHTH.

DISTINCTIONS OF REASONING, AND USES OF LOGICAL RULES.

Q. What is a Demonstration?

A. A demonstration is an argument, or series of arguments, whose premises are self-evident truths, or propositions previously proved or admitted, from which the conclusion is truly and necessarily inferred.

Q. How are demonstrations carried on by a train of syllogisms?

A When a demonstration consists of a series o arguments, the proofs are successively deduced from first principles by a train of *syllogisms*, inasmuch as each step in the process is inferred according to some general truth, which is usually a tacit or suppressed proposition; but which, if expressed in words, would complete the syllogism in form. Now it often happens that the conclusion of one syllogism, becomes one of the premises to another, by which means, great numbers of them are linked together in a series, and truths are made to follow one another in train, by a necessary connexion from first principles to the conclusion; this is the manner of demonstration.

Q. How does it appear, that in demonstration all the several kinds of syllogisms may with safety be introduced?

A. Because, that all syllogisms, whether compound, multiform, or defective, are in the first place reducible to plain simple syllogisms in some one of the three figures; and secondly, that syllogisms of the other two figures are reducible also to syllogisms of the first figure, as is universally admitted. Hence it is plain, that any demonstration whatever, may be considered as composed of a series of syllogisms all in the first figure.

Q. What then is the general principle by which conclusions in the first figure are legitimately deduced from the premises?

A In the first figure, *the predicate of the conclusion* is first universally affirmed or denied of some general term.

The subject of the conclusion is next in the minor affirmed to make a part of that general term. Hence, it unavoidably follows, that the *predicate of the conclusion* ought to be affirmed or denied of the subject. Or, in other words, the conclusion affirms or denies something of a certain species or individual, after it has been shown or admitted that the same thing may be affirmed or denied of the whole genus, to which the species or individual belongs. This may be seen in the following example.

All animals are mortal ;
All men are animals ;
Therefore all men are mortal.

Here the conclusion affirms that all men are mortal, because they are found to belong to the general class, *animals*, which are admitted to he mortal.

Q. How do the Rules of Logic furnish a sufficient criterion for distinguishing between truth and falsehood ?

A. To judge of the validity of a demonstration, we must be able to distinguish whether the definitions that enter into it are adequate and precise, whether the propositions assumed as intuitive, or as previously demonstrated are really such ; whether the syllogisms are drawn up in due form, and are combined together in a just and orderly manner, so that the several conclusions necessarily follow from the premises, agreeably to the laws of argumentation. Now it is the business of logic in its several parts fully to instruct us in all these particulars. Logical rules, therefore, as they enable us to judge with certainty, when a proposition is duly demonstrated ; furnish a sure criterion in all demonstrable subjects, for distinguishing between truth and falsehood.—*Duncan's Logic.*

Q. How are they of equal importance in regulating our judgment on subjects of moral reasoning ?

A. Here the precepts of logic, by teaching the correct use of terms, by explaining the different kinds of evidence, and modes of ratiocination ; enable us to make a due estimate of the measures of probability, or, to judge of the nature and force of the proofs that come under consideration.

Obs. It is the part of wisdom to acquiesce in that kind and measure of proof which the nature of the subject admits, and neither to be satisfied with probability where certainty is attainable, nor to withhold our assent for want of demonstration, where all the proof is furnished of which the nature of the subject is susceptible.

" If we *proportion our assent in all things to the degrees of evidence,* we do the utmost that human nature is capable of in a rational way, to secure itself from error."—*Watts' Log.* p. 2. chap. 2. sec. 8.

DISTINCTION OF DEMONSTRATION INTO DIRECT AND INDIRECT.

Q. What is a direct demonstration ?

A. A demonstration is direct, when from self-evident premises, the conclusions are severally deduced by an intuitive agreement with the next preceding, until we arrive at the last conclusion or proposition to be demonstrated.

Thus, all direct reasoning proceeds in this order from first principles to the conclusion, shewing by means of proofs, the agreement or repugnancy between the subject and predicateof the proposition in question.

Q. What is indirect reasoning ?

A. It is that by which we deduce the truth of a proposition, by first proving the falsehood or absurdity of the proposition to which it is opposed ; which being done, the truth of its opposite follows by an immediate consequence.

Q. By what principle do we infer the truth of one proposition from the falsehood of its contradictory.

A. By this self-evident principle, that as every demonstrable proposition is necessarily true, its contradictory or opposite must be necessarily false ; hence, the truth of the one necessarily follows from the falsehood of its opposite.

Q. How does it appear that mathematicians make use of indirect reasoning ?

A. Thus, Euclid in order to demonstrate *that circles which touch one another inwardly have not the same centre,* assumes directly the contrary, viz. ; *that they have the same centre ;* and thence by an evident train of reasoning from this supposition proves, *that a part is equal to the whole.*—The supposition, therefore, leading to this absurdity as a necessary consequence, he rejects as false ; and thence immediately infers the contrary truth, *that they have not the same centre.* In like manner, by a train of indirect moral reasoning, we prove that *there is a God*, that *the world*, and that *mankind also, had a beginning ;* by tracing the absurdities to which the contrary suppositions necessarily lead. This method of proof is called a *reductio ad absurdum.*

Q. How does it appear that indirect demonstration also, is a sure guide to certainty ?

A. Thus, in this we assume a proposition which directly contradicts what we mean to demonstrate : and having by a continued series of proofs, arrived at a conclusion which is false, it is plain that the falsehood must be in one of the premises ; for, *a false conclusion can follow legitimately only from false premises.* When such assumed proposition therefore, in the way of direct demonstration leads to an absurdity, or known falsehood, the proposition itself is proved to be false ; hence its contradictory, or the proposition to be proved, is necessarily true.

Q. Why is a knowledge of the principles of logic necessary to make us proper judges of demonstration ?

A. Because, cases may occur, in which the truth of the proposition demonstrated will neither be perceived nor acknowledged, unless we know by means of logic, that a conclusion thus deduced is necessarily true and valid.—For, although we may at once discern, that the truth of any proposition necessarily follows from the falsehood of its contradictory, yet from the false conclusion to which any proposition evidently leads, to be able to perceive how itself is false, and thence to discover how its contradictory is proved to be true ; requires a knowledge of the principles of logic, and of the nature of reasoning.

Q. What other advantage results from understanding the nature and validity of indirect reasoning ?

A. This important advantage results, that in proof of such propositions as admit of no arguments in a direct way ; the mind is led to assume the contrary side, where oftentimes the proofs in the indirect way are complete and conclusive. In this manner a multitude of truths are satisfactorily established, which, without a knowledge of indirect reasoning, must remain in uncertainty, and the investigation of them be abandoned as useless.

Q. What is the distinction of reasoning, termed *a priori* and *a posteriori* ?

A. Reasoning *a priori*, is that in which we argue from the cause to the effect, or from definitions and first principles to the conclusion; as, *the scripture is infallible, because it is the word of God, who cannot lie.* So, in mathematical demonstrations, the conclusions are directly deduced from definitions and assumed principles. All such are called demonstrations or arguments *a priori*, because the premises are supposed to be known before the conclusion.

Q. What is reasoning *a posteriori ?*

A. This is the reverse of the former process, and is arguing from the effect to the cause; and as all effects are posterior to their causes, these demonstrations are called arguments *a posteriori.* In this manner we infer the existence and attributes of the Creator, from the things that are made, and their adaptation to answer the purposes of their existence. All reasoning concerning the properties and laws, both of body and mind, proceeds in like manner from effects to causes, and to this method of investigation have been owing all the discoveries and improvements in modern philosophy.

Obs. The truths that are deduced and demonstrated by *a priori* reasoning, are of the class called *necessary* ; the conclusions following necessarily from the premises: and are less numerous than those which are traced by reasoning *a posteriori.* The former kind of investigation employs syllogism, but the latter naturally falls in with the method of induction.

Still, we are not to conclude from hence, that syllogism has no use or application, except in demonstrable propositions, whose truth is deducible by arguments *a priori* : for most of the reasoning of common life which we employ for the purpose of *evincing truth to others*, is of the nature of syllogism; and proceeds by shewing the agreement or repugnancy of things brought into comparison, and drawing conclusions accordingly.

SECTION NINTH.

OF SOPHISMS.

Q. What is a Sophism?

A. It is an argument, which carrying the appearance of truth and correctness, leads to a false conclusion.

Obs. The fallacy in all sophisms must be either in the deduction or inference, or in one of the premises: most generally it lies in the premises.

Q. What is the nature of the sophism, called *ignoratio elenchi*, or a misapprehension of the question?

A. This is when an argument is employed to refute or establish a point which is not the subject of debate, but something foreign to the question; as if the question were, *whether excess of wine be hurtful to those who indulge in it;* and any one should argue, that wine revives the spirits, gives a man courage, and makes him strong and active, and then takes it for granted that the point in debate is fully determined. Whereas the question is not, what are the effects of wine taken in moderation, but what are its effects when taken to excess.—*Watts' Logic.*

2. Thus Paschal arguing against atheists, insists that atheism is more dangerous than theism. Whereas the point in debate is the *truth*, and not the *prudence* of either system.

3. So, many attempts to defend christianity, which do little more than show its superiority to all other systems of religion, are mistakes of the question; since they urge it upon our belief and acceptance, by no divine authority, or sanction, higher than that of expediency: whereas, its *divine origin* is the great point of inquiry.

Q. What is the nature of the sophism, called *petitio principii*, or a begging of the question?

A. This is taking for granted the point to be proved; or it is proving any proposition by the same proposition, or its substance, in other words; as,

> There is no salvation out of the church;
> Protestants are out of the church;
> Therefore protestants cannot be saved.

Here the minor proposition is begged; it being the very question in debate, whether protestants are, or are not, in the true church.

2. Thus necessarians attempt to prove that the will is always influenced by the strongest motive; and if any motive appeared to be so before, as well as after the election, their position would be just. But it cannot be proved that it is the strongest motive, except from the fact that it has prevailed: and to infer the preponderance of the motive before election, from its appearance after election, is a mere *petitio principii*, assuming that for true which their opponents deny.—*Witherspoon*, *Lec.* *Kirwan*, *Log.* No. 804.

This argument respecting the will, Mr. Stewart classes among those which prejudge the very point in dispute, and are only a series of identical propositions, or a sophistical circle of words.—*Elem.* chap. 4. sec. 4.

Q. What is that mode of argumentation, called *arguing in a circle?*

A. It is a sophism nearly allied to the former, "and consists in making two propositions reciprocally prove each other."

Thus the papists prove the truth of the scripture by the infallible testimony of the church; and then prove the infallibility of the church by the authority of the scriptures.

2. In like manner, an ancient philosopher asserted, that the stars seem to twinkle on account of their immense distance; and then asserted, that they were immensely distant, because they are seen to twinkle.

Q. What further seems worthy of remark respecting a circle?

A. It is, that arguments are sometimes charged with forming a circle when they are not of this nature. Thus, when in proving the authenticity of the scriptures, the evidence of miracles is brought to establish the fact of their being a divine revelation; and then the *intrinsic excellence* of scripture doctrines is urged as affording a presumption in favour of miracles having been wrought, to attest the divinity of the scriptures; this is not arguing in a circle, as some have alleged.

If miracles were brought to prove the *excellence* of scripture doctrines, and the *excellence* of scripture doctrines to establish miracles, then there would be a circle: but as a miracle only attests the *divinity* of the doctrine, and not its *excellence;* there is no circle or reciprocation of proofs.

Q. What is the nature of the sophism, called *non causa pro causa*, or the *assignation of a false cause?*

A. This is attempting to account for an event, by assigning as a cause, something that has no perceivable connexion with it The old philosophers were guilty of this, when they affirmed that *nature abhorred a vacuum*, and that this was the cause why the water would not fall out of a long tube if it was turned upside down; and the moderns fall into this fallacy whenever they positively assign the reasons of natural appearances, without sufficient experiments to prove them.

2. So, when upon the concurrence of any two accidental events, one is made the cause of the other, barely on account of their nearness in time or place; it is a fallacy that belongs to this class of sophisms.

Q. In what other instances is it practised?

A. Weak and ignorant people fall into this fallacy, when they attempt to trace any pestilence or other calamity, to some uncommon occurrence that happened to precede it; as, an eclipse, or the appearance of a comet, for instance: or when they interpret the afflictions of individuals, as divine judgments inflicted in consequence of certain flagrant crimes that they have, or are suspected to have committed. This was done in the case of pious Job.

2. The same sophistry is practised by fortune-tellers and pretenders to supernatural skill in interpreting dreams and other omens; who avail themselves of the superstition and credulity of mankind, to promote their own advantage.

Q. In what consists the sophism, termed *fallacia accidentis?*

A. It consists in pronouncing concerning the nature and essential properties of any subject, from something that is merely accidental to it.

As, when a person decides that certain medicines are salutary, or noxious, universally; because they have operated favourably, or unfavourably, in particular instances. So the blemishes or crimes of a few individuals of some particular nation, sect, or profession; have frequently been imputed to all those of the same nation, sect, or profession.

2. Upon this same fallacious principle; learning, the reading of the bible, and christianity itself, have been denounced as injurious to mankind; because they have been occasionally abused to produce mischievous effects, or perverted to subserve unhallowed purposes.

Obs. This sophism usually involves an erroneous generalization, as it proceeds upon accidental, local, and partial connexions; instead of those that are invariable and universal. It frequently substitutes the exception for the general rule, and is therefore a *vitious* induction.

DISTINCTIONS OF CAUSES.

Q. How are the different sorts of causes denominated and defined?

A. An *efficient cause* is that whose action or energy is itself sufficient to produce the effect. It must be some real agent possessed of will and intelligence; as God, and the human soul.

A *physical* or *secondary cause* is the "invariable material antecedent of any change or event." The power and efficiency producing such change must be traced to mind, which is the only real efficient.

The *conditional cause*, or *causa sine qua non*, is that which must precede the effect as the necessary condition of its existence; as light is necessary to vision.

The *instrumental cause* is that by means of which a superior agent produces the effect. Thus men become instrumental causes in the hand of the Deity.

The *final cause* is the particular end which the will of the agent pursues, and aims to accomplish.

Moral causes or motives, are the reasons on the view of which the mind acts.

Privative causes denote the mere absence of something which occasions certain consequences or effects to follow; as, the absence of light occasions darkness.

And lastly, our *ignorance* of the cause in any case is called *chance*.

PART IV.

DISPOSITION OR METHOD.

This is the last and not the least important division of logic, as it teaches the application of the principles and modes of reasoning already explained, in the discovery, arrangement, and communication of truth. In this part of logic, some writers have attempted little more than a description of the Analytic and Synthetic methods; others at great length have illustrated the uses of method in mathematical investigations, and other subjects of demonstration; but have not shown its connexion with the philosophy of the human mind, nor its applicability to other branches of knowledge for the purposes of discovery and invention.

These deficiencies, it has been the aim of the writer to supply; in attempting which, he has frequently availed himself of the ingenious remarks of Mr. Stewart and others, so far as they seemed appropriate to the subject.

SECTION FIRST.

ANALYTIC AND SYNTHETIC METHOD.

Q. What is meant by method ?

A. By method, in logic, is meant the proper disposition and arrangement of our thoughts on any subject, in such order as to exhibit their mutual connexion and dependence.

Q. What purposes are answered by such an orderly arrangement ?

A. Such an arrangement facilitates the discovery of unknown truths ; aids in explaining and confirming truths that are known ; and lastly, enables us the better to retain in memory, the knowledge which we have acquired.

Q. What is one of the first and most obvious advantages of method, as it respects the knowledge we have already acquired ?

A. It serves to rescue our thoughts from that confused and disorderly mass, in which they are at first received into the mind : by marshalling them in that order and connexion which will show their mutual relations ; or, by arranging each idea, argument, and topic, under its appropriate subject, or general principle.

Q. What illustration may serve to shew the general importance of methodizing our thoughts ?

A. Thus, suppose a set of printing types, consisting of all the letters in the alphabet, to be thrown into one confused heap ; they are wholly unfit for the compositor's purpose until they are assorted into separate parcels, each being arranged under its own proper letter. In this orderly condition, they are ready for speedy use, without any search or previous inspection of the individuals.

Such a representation is not an exaggeration of the difference, between a mind which has never learned to think and reason in train coherently ; and one which is well disciplined by a methodical arrangement of its knowledge.

Q. What is the ground of the very general misconception on this subject ?

A. Most persons who have not been taught systematically, are apt to conceive ; that for the attainment of knowledge, nothing more is necessary, than an accumulation of ideas and of facts, without any regard to order and connexion ; the number of which, when fixed in the memory, renders one man's mental stock greater than another's. Hence to go on adding to the heap, is thought to be the only way of enriching their minds, and of extending their acquisitions : whereas real knowledge and science are chiefly obtained by the contrary process, by tracing things back from the wholes or compounds, to their elementary parts and first principles ; in order to investigate their mutual connexions and relations.

It is by this retrograde process that all discoveries are made in the philosophy of language, in rhetoric, in criticism, in logic, and the like : for this is tracing them back to the nature of things, in which they are founded.

Q. What are the two divisions of method which it is the business of logic to explain and inculcate ?

A. These are the *Analytic* and the *Synthetic method.*

Q. What may be remarked of these two kinds of method ?

A. The analytic method is the best adapted to the discovery of truth, and from this process by analysis most inventions have resulted ; hence it has been called the *method of invention.*

The synthetic method is best suited to the communication of knowledge ; in this order most of the sciences are taught, and the mechanical arts are learned, proceeding from the more simple and obvious parts to the more complicated ; hence this is denominated the *method of Science.*

Q. What is the nature of the process by analysis ?

A. The analytic method commences with the whole compound, whether it be a process of art or of science, or a material substance, and leads us into a knowledge of it, by resolving it into its first principles, or parts, and therefore it is called the *method of resolution.*

Q. What is the synthetic process ?

A The synthetic process begins with the parts, and proceeds in the order of combination to the knowledge of the whole ; or it begins with first principles, and connects them according to their mutual dependence, so that the truths first in order tend always to the demonstration of those which follow ; thus from known truths deducing those which were unknown and remote ; hence it is called the *method of composition.*

Q. As both these methods are sometimes employed on the same subject, by what example may they be illustrated in connexion ?

A. For this purpose, it is usual to suppose some complicated machine, as a watch, for instance ; the inward construction and principles of which it is our object to discover. By commencing in the analytic method we take the whole gradually to pieces, and examine the parts separately as we proceed ; till we ascertain the position and office of each particular that enters into the mechanical construction, and thence discover the principles from which its several operations result. Here, where the analysis ceases, the investigation is supposed to cease, and the discovery to be made. But supposing the discovery not yet completed, we may afterwards adopt the synthetic method ; and beginning with the parts, in a state of separation, place them successively in their former order, till the combination is restored.

Q. From the above illustration what may be remarked respecting the two methods ?

A. It is, that the mental research and discovery belong to the analytic process, provided this be successful ; and it is generally so considered in styling this the method of invention or discovery. Wherever this is actually the case, the opposite process by synthesis, which proceeds with the parts successively, till the same combination is restored, becomes a mere mechanical operation.

Q. How far is the example of the watch applicable in illustrating the two methods ?

A. It is applicable in all cases where the analysis proceeds by resolving any compound subject into its elementary parts or first principles, and for the purpose of discovering the constituents or simple principles that enter into the whole combination. Such is the process and such the object of all analyses in chemistry, anatomy, botany, and other branches of natural knowledge. But in these instances, to restore the combinations by the synthetic process, is seldom necessary to prove the correctness of the analysis. In some it would be impossible, as in botany ; in others absurd, " as in natural philosophy." *Stewart's El.* chap. 4.

Obs. The terms analysis and synthesis have no invariable signification, but in some sciences they denote different processes from what they do in others; hence, where one writer employs the word analysis, another would have used the word synthesis.

The explanation given in this section, is of the *logical* or *physical* analysis, which differs essentially from the mathematical analysis hereafter to be described.

Q. What may be farther added respecting the analytic and synthetic processes, in this logical sense of the terms?

A. In this *logical sense*, the terms are used by most writers, and are employed to denote the opposite processes of resolution and composition. By the former, we trace back the several parts of a mathematical demonstration in the reverse order of their combination, unravelling the series from the conclusion to the first principles on which it rests. In this manner, by analysis, most of the improvements in the different arts and sciences have been made.

The synthetic process is the reverse of the analytic, as it begins with the parts or first principles, and proceeds to restore the combination or whole. Thus a demonstration proceeds synthetically, by beginning with definitions and first principles, and advancing directly to the conclusion; making each previous step subservient to that which follows.

This is the most easy and natural method of communicating instruction in all the sciences; inasmuch as, by proceeding in this order, every advance is made from something previously known, and is attended with evidence and conviction.

Q. For what obvious reason is the analytic process the best adapted to the investigation of truth, and the most employed for this purpose?

A. This coincides with the order of nature, since we first become acquainted with things in their combinations and results, and then are led to investigate them in their parts and principles for the purposes of knowledge. The works of nature and of art, all the inventions of former generations, are presented to us already formed. To analyze them into their simple parts is the surest method of ascertaining the properties and the principles that enter into their construction or composition.

Q. What may be farther remarked respecting discoveries by analysis?

A. It is by this method that most discoveries have been made, tracing things from their effects to their causes ; and whoever would understand things philosophically, must arrive at his knowledge by the analytic process. In this consists chiefly the difference between the philosopher, and the superficial observer ; the one knows things in their constituent parts and mutual relations, the other only in their outward appearance and general uses.

Q. How does it appear that the synthetic method is generally used in teaching the sciences after they are invented ?

A. Thus, for instance, in learning to read and to write, as also in gaining a knowledge of arithmetic ; the pupil is conducted from the more simple parts, to the more general, and from things known, to those that are unknown ; which is following the order of synthesis. At the same time the teacher uses chiefly the analytic method.

So, in arithmetic, the rules prescribed for the solution of questions, are obtained by analytical processes ; and the teacher traces the principles on which the rules are founded, and demonstrates the rules by analysis ; while the pupil follows the prescribed rules, in the synthetic order.

Q. How does it appear that some of the sciences are treated in both the analytic and synthetic order ?

A. Thus, logic is begun in the analytic method : it is first distributed into its four integral parts, and these again are distinguished into their several sub-divisions : under the first general head, the principal mental operations are analyzed, and complex objects of thought are resolved into simple ones : then beginning synthetically, it teaches us how complex ideas are made up of simple ones, how propositions are made up of ideas, and syllogisms of propositions ; which is the order of composition.

Obs. Sometimes a process is analytic in its nature, when from the order of it, and the result to which it leads, it would appear to be synthetic.

So when by analyzing individuals, we find some property common to them all from which we form a species ; and when by analyzing several species, we in like manner form a genus, at each step ascending to the higher classes ; this might appear to be the synthetic process. So in physics, when the philosopher descends from compounds to ingredients, and from general effects to particular causes, and at each step remounts to conclusions more general, till the argument ends in the most general; this is still the analytic method, although it advances from particulars to generals.

Q. In what respects does the analytic method sometimes proceed in a manner somewhat different from that already explained?

A. It does not always begin with some *whole subject* and proceed to the knowledge of its parts, but it sometimes begins with any part of the subject that happens to be first, or more easily known, and thereby inquires into the more remote and unknown parts, properties, and relations.

Again—It sometimes finds out effects by their causes, as when it traces the uses and effects of such powers of motion, as wind, steam, and water; when applied in the operation of mills, engines, and other machinery. So in the application of mathematical principles to the useful arts, the *modus operandi* of accomplishing the end is traced analytically, but is carried into effect synthetically.

Q. What is another office of analysis of a similar kind?

A. It finds the means necessary to attain a proposed end, by having the end first assigned. So in forming a plan of government for a society or a nation, in order to their best interests; we search out and determine what are the proper laws, rules, and institutions, for effecting the end. So also in the works of art, as the fabrication of cloth, the construction of buildings, or the invention of machinery; the ends and results are first proposed and considered, then these are traced back by the mind to first principles, and their connexion with known truths is demonstrated. But the putting any of these means into execution to attain the end, is the synthetic method.

Q. What is another illustration of these two methods?

A. In planning a ship of war, the multitude of particulars that enter into the construction must be conceived and adjusted in the mind of the artificer, and the adaptation of the parts to the whole must be determined by analysis; while the execution after the proposed model, is according to synthesis.

SECTION SECOND.

OF THE MATHEMATICAL ANALYSIS AND SYNTHESIS.

Q. Why is it proper to explain the mathematical analysis separately, and to distinguish it from the physical or logical analysis already explained?

A. Because the meaning conveyed by the word analysis in physics, in chemistry, and in the philosophy of the human mind, is radically different from that which is annexed to it in mathematics and geometry; and hence the term is often employed by different writers, to denote different and opposite processes. In all the former sciences, as has been already shown, it naturally suggests the idea of "a decomposition of what is complex into its constituent elements."—*Stewart's El.* vol. 2. chap. 4. sec. 3.

Q. What points of resemblance and of difference are there between these two kinds of analysis and synthesis?

A. They resemble each other in little else than this, that both of them are methods of investigation and discovery; on the contrary, there is a wide and essential difference between the subjects to which the two kinds of analysis are applied.

As first, in mathematical analysis, we always set out from a *hypothetical assumption;* that is, assuming the principle or proposition to be proved, as something already known or done; from this assumption, our object is to arrive at some known truth, or to deduce some known truth as a necessary consequence; from which, by reasoning synthetically, we may afterwards return in the same footsteps to the point where our investigation began.—*Ibid.*

Q. What may be further remarked secondly?

A. In all such cases the synthesis is infallibly obtained, by reversing the analytic process; and as both of them have in view the demonstration of the same theorem, or the solution of the same problem, they form only different parts of one and the same investigation. Here also the latter process is necessary to establish the truth and correctness of the former, but in the analysis by decomposition, the object of discovery is commonly attained without the synthetic process.

Q. On what general axiom does the conclusiveness of an analytical proof in all cases rest?

A. On this maxim, "that *truth* is always consistent with itself;" that a supposition which leads by a chain of mathematical deductions, to a consequence which is true, must itself be true; and that which necessarily involves a consequence which is absurd or impossible, must itself be false. (See indirect demonstration.)

Q. Why is the synthetic method ill adapted to the investigation of new truths?

A. Because in order to accomplish the end proposed, it is necessary for a person previously to know the means, or steps that will conduct to it; which is, to possess beforehand the very knowledge that he is in quest of. But for the want of this, he has nothing to guide him in the selection and arrangement of the parts, nor in the line of deduction which he is to pursue; so that all his attempts would be merely groping in the dark, and pursuing an unknown object without rule or method. Just as if one should attempt to make some compound mixture of a certain kind, without knowing the ingredients of the composition; in which case, he might make numberless trials with different ingredients, before his attempts should prove successful.

Q. How is the superiority of the analytic to the synthetic method shown?

A. Suppose now, that we reverse this order, and prosecute the investigation analytically, assuming (agreeably to the explanation already given) the proposition to be true, and attempting from this supposition to deduce some known truth, as a necessary consequence.

We have here one fixed point from which we are to set out, while it is perfectly immaterial in what particular conclusion the deduction terminates, provided this conclusion be previously known to be true.

Instead, therefore, of being limited, as before, to one *conclusion exclusively*, and left in a state of uncertainty where to *begin* the investigation; by commencing the analysis with one single supposition and deducing its consequences, the path which we follow may terminate with equal advantage in a variety of different conclusions; from any one of which as a known truth, we have only to return upon our own steps, in order to convert the analytic process into a direct synthetical proof.—*ibid.*

Q. How does it appear that both these methods are necessary in one and the same investigation ?

A. Thus, after we have by the analytic process, unravelled the whole, and reached the very foundation on which our discoveries stand ; all our certainty in regard to their truth, will be found to arise from that connexion we are now able to discern between the results and first principles, taken in the order of composition. Therefore the synthetic process, which returns in the same steps, deducing the conclusions from known truths by direct demonstration, establishes the truth of the analysis.

Coroll.—Hence we see how that after truths have been discovered, and the rules of operation obtained, by the former process, they are then communicated to others by the latter.

Q. What is Mr. Stewart's example for illustrating the superior adaptation of the analytic method, to the discovery of truth ?

A. Thus, " suppose a knot of a very artificial construction were put into my hands, as an exercise for my ingenuity, and that I was required to investigate a rule which others as well as myself might be able to follow in practice, for making knots of the same sort. Here, common sense could not fail to suggest immediately the idea of tracing the knot through all the various complications of its progress, by cautiously *undoing* or *unknitting* each successive turn of the thread in a retrograde order from the *last* to the *first*. After gaining this *first* step, were all the former complications restored again, by an inverse repetition of the same operations, which I had performed in *undoing* them ; an infallible rule would be obtained for solving the problem originally proposed."—Vol. 2. chap. 4. sec. 3.

SECTION THIRD.

ADDITIONAL REMARKS ON THE METHOD OF INVENTION.

Q. What is meant by the method of invention?

A. By the method of invention we understand the disposition and arrangement of a variety of thoughts on any subject, in such order as may best serve to find out unknown truths. The devising and supplying those several helps and contrivances by which the mind is enabled to facilitate and extend its discoveries, more properly belongs to the *Art of invention.*

Q. What constitutes the difference between Invention and Discovery?

A. The object of invention is to produce something which had no existence before; that of discovery is, to bring to light something which did exist, but which was concealed from common observation. Thus we say, Newton and Gregory invented the reflecting telescope. Galileo discovered the solar spots, and Hervey discovered the circulation of the blood.

Hence, improvements in the arts are properly called inventions; and facts brought to light by means of observations are called discoveries. A person who contrives a new method of discovering truth, is styled an inventor, and every contrivance by which we produce an effect, or accomplish an end, is considered an invention.—*Stewart*, vol. 1. part 1. chap. 5.

Obs. Notwithstanding the above distinction, the processes of invention and discovery are so much the same as to admit of their being jointly considered under the present article, the remarks and rules applying alike to both.

Q. What constitutes the talent or aptitude for invention?

A. Besides a certain originality of genius for any art or science which it implies, the person who possesses it must have acquired, by previous habits of study, a competent knowledge of the sciences to direct his inquiries; and a command over those classes of his ideas, which are subservient to the particular effort that he wishes to make.

Q. In what manner is this *command* chiefly acquired ?

A. " In the first place, by his habits of speculation he may have arranged his knowledge in such a manner as may render it easy for him to combine, at pleasure, all the various ideas in his mind which have any relation to the subject about which he is occupied ; or, secondly, he may have learned by experience certain general rules, by means of which, he can direct the train of his thoughts into those channels in which the ideas he is in quest of may be most likely to occur to him."—*Stew. El.* vol. 1. chap. 5. sec. 4.

Obs. Such general rules as handmaids of invention and discovery, must be obtained chiefly by one's own experience, while exerting his inventive powers in the use of such means and helps as are most likely to attain the end he is in quest of. And when after repeated trials, he succeeds in the discovery, he is naturally led to retrace his steps, and examine how he happened to miscarry in his first attempts, and by what particular method of procedure he at length became successful ; and thence he obtains a rule for his future operations.

In like manner, the rules and methods by which all inventions in the arts and sciences are promoted, are acquired by practice, and a familiarity with those modes of operation by which they are suggested : the knowledge of which rules, is, in the same degree, the knowledge of the art itself.

Q. What are considered the two primary requisites for invention ?

A. First—a comprehensive understanding, capable of embracing the multitude of particulars that frequently come under the notice of the mind in one investigation.—*Duncan.*

Secondly—a strong habit of attention, that holds its objects steadily in view, until we distinguish carefully all those circumstances which tend to the illustrating and clearing of the subject we are upon. Both these qualifications are chiefly the fruits of a proper cultivation, and may be improved and strengthened to a degree almost beyond belief.

Q. For this purpose, what are some of the advantages resulting from the study of mathematics ?

A. This study habituates the mind to long and difficult investigations, and also to a connected train of thinking and reasoning; by which means it tends to discipline the mind, and to impart to it a perfect command of attention. Also, it increases the capacity of the understanding, insomuch that a long and intricate series of reasoning is often comprehended with scarce any labour of thought. In these several ways, it furnishes both the materials and the ability for future investigations and discoveries.

Q. What does Mr. Stewart consider as one of the most successful modes of promoting mathematical invention?

A. It is the investigation of problems, "which seldom fails to exhibit to us some relations formerly unobserved, among the quantities under consideration." "Of so great importance, (he adds) it is to concentrate the attention to a particular subject, and to check that wandering and dissipated habit of thought, which in the case of most persons, renders their speculations barren of any profit either to themselves or to others."

Q. What is another requisite and help to invention?

A. Besides a previous stock of knowledge relative to the subject, and a strong habit of attention by which the mind can pursue a difficult investigation without fatigue; the next requisite to the discovery of truth, is a judicious choice of intermediate ideas: and the great art lies in finding out such as have an obvious connexion with the ideas whose relation we inquire after.

Q. How does this appear?

A. It is by such intermediate ideas as may shew the relations between the several propositions we connect together, that we advance, step by step, to the discovery we are in quest of: since they furnish us with known and evident truths, to serve as premises for the discovery of such as are unknown; it being obvious that unknown propositions can no otherwise be traced, than by means of some connexion they have with such as are known.—*Duncan.*

Q. Another requisite to invention, is a certain sagacity and dexterity in singling out the most proper materials, and applying them skilfully in the discovery of truth—how is this promoted by the study of algebra?

A. It is a fact well known to those who have made any considerable progress in the study of algebra, that a skill and dexterity in managing intricate questions, may be obtained by a careful imitation of the best models. By being much conversant with such artful solutions of questions, we by degrees, arrive at a great mastery not only in devising proper equations, and in coupling them together, so as from the more complicated to derive others that are more simple ; but also in contriving useful substitutions to free our calculations from fractions, and those intricacies that arise from surds and irrational quantities.—*Duncan.*

Q. How do algebraic processes afford a specimen and an illustration of the method of invention ?

A. The business of invention as practised in algebra, depends upon so disposing of the several parts, when they become too unwieldy to be dealt with in the mass ; as that each may be handled separately without fatigue, and may at all times lie open to the leisurely survey of the mind.—It is also much facilitated by reducing the number of particulars taken under consideration at once, to the fewest possible ; and establishing that progressive method of investigation, by which we may proceed with the analysis, part by part easily ; and have recourse to any of them at pleasure, so that they all in turn, may furnish their assistance towards the discovery of what we are in quest of.

Above all, the symbolical language employed in algebra, is that which contributes to the discoveries that are made by this science

Q. What is the result of this artful and methodical arrangement ?

A. Hence it happens that truths very remote and otherwise undiscoverable, which lie far beyond any single effort of the mind, are yet by this progressive method already described, successively brought to light, and that too, without any considerable mental labour or fatigue.

The easy solution of complicated questions by algebra, and the numerous discoveries in mathematical science to which it has given birth, have caused it to be styled the art of invention. So in the other branches of knowledge, a similar disposition of our thoughts, and progressive investigation of the parts of the subject ; is, so far as it is practicable, the method best adapted to the discovery of truth ; and to the producing of any effect in the way of invention.

Q. How is the like advantage of skilful arrangement, and a progressive consideration of the parts manifest from common operations in arithmetic ?

A. In multiplication for instance, let a man endeavour in his thoughts to find the product of two numbers each consisting of twenty places, and that without considering the parts separately ; and he will at once be convinced, that it is an effort too great for the human mind.

But in proceeding progressively with the parts according to the common rules of operation, we have only to multiply, successively, each figure in the multiplier into the whole multiplicand ; and then by reason of the artful notation of numbers which assigns them a value according to the place they occupy ; whether we are handling the combinations of tens, hundreds, or thousands ; we proceed with them all as simple digits, counting the highest combinations as so many single units, and regarding only the places which their sums obtain in the total amount. This is the effect of a masterly method.

Such astonishing results obtained with so much ease and accuracy, will, to any one who duly considers the subject, exhibit the science of arithmetic as a master-piece of human invention ; and give him some just conception of the advantages of method in general, in the discovery of truth.

Q. In physical science, how does it appear that a methodical arrangement is favourable to discovery ?

A. The history of natural philosophy before and after the time of lord Bacon, (says Mr. Stewart,) affords a very striking proof, how much the powers of invention and discovery may be assisted by the study of method.—Vol. I. chap. 5. p. 1.

Q. How is this principle illustrated ?

A. Habits of speculation have a tendency to classify our ideas, by leading us to refer particular facts and particular truths to general principles ; and such a classification, like the assorting of the printers' types, enables the mind to bring into comparison a greater number of related ideas, from which new discoveries in most instances result ; so that the knowledge of the philosopher is arranged in a manner much more favourable to invention, than in a mind unaccustomed to system

Q. How is it accounted for, that situations of alarming difficulty and danger quicken men's powers of invention ?

A. "In such cases," says Mr. Stewart, "I take it for granted that necessity operates in producing invention, chiefly by concentrating the attention of the mind to one set of ideas; by leading us to view these in every light, and to combine them variously with each other. As the same idea may be connected with an infinite variety of others by different relations; it may, according to circumstances, at one time suggest one of these ideas, and at another time a different one."

Q. What resemblance is there between this invention which is prompted by necessity, and philosophical invention?

A. Those powers of invention which necessity occasionally calls forth in uncultivated minds, and which renders them so fruitful in expedients, some individuals possess habitually. In their minds the related ideas necessary to their purpose, present themselves on all occasions, in consequence of a more systematical arrangement of their knowledge.

Q. What other advantage attends a philosophical arrangement of our ideas?

A. The man who has the particulars of his knowledge philosophically arranged under their general heads, knows always where he is to search for them, so as to bring them all to bear on their proper object When he wishes to avail himself of his past experience, or of his former conclusions; the occasion itself summons up every thought, fact, and argument, which the occasion requires: or, if he is called upon to exert his powers of invention and discovery, the materials of both are always at hand, and are presented to his mind with such a degree of connexion and arrangement, as may enable him to trace with ease, their various relations.—*Stewart.*

Obs. Hence in order to possess an habitual fertility of invention in any particular art or science, so that one may rely on his inventive powers whenever he is called to exert them; he must have acquired by previous habits of study, and a methodical arrangement of his knowledge; a command over those classes of his ideas that are subservient to his purpose.

Q. How does the confining of our attention to the same idea, or dwelling on the same investigation, promote invention and discovery?

A. When we dwell long on the same idea, we obtain all the others to which it is in any way related; and thus are furnished with the materials of investigation, on which our judgment and reasoning may be employed for accomplishing the end proposed.

On the same principle it is, that the division of labour, by limiting the attention of men to a particular subject, familiarizes to the mind all the different combinations which have any relation to it; and from this circumstance most of the mechanical contrivances and improvements in the arts have resulted.

Q. In what way do mere hypothetical theories promote discoveries in philosophy?

A. Such theories have been frequently of use in putting philosophers on the road of discovery; indeed, it has probably been in this way that most discoveries have been made. A fortunate conjecture, or a wise query, is oftentimes the one half of discovery.

Every philosophical inquirer before he begins a set of experiments, has some general principle in view, which he suspects to be a law of nature; which conjecture serves to give his inquiries a particular direction, by limiting the field of his observations and experiments to a definite object. Whereas, were he to set himself merely to accumulate facts at random, he might perhaps stumble on some important discovery, but by far the greater part of his labours would be wholly useless.

"The great doctrine of gravitation took its rise from a fortunate conjecture;" many other discoveries the most important to mankind, may be traced to a similar origin.—*Stewart*, *El.* chap. 6. sec. 7.

Q. What is to be understood by the rules of an art?

A. What we call the rules of an art, are merely a collection of general observations, suggested by long experience, with respect to the shortest and most effectual means of performing the different steps of the processes which the art involves.

Obs. It has been already remarked, that understanding the rules of an art experimentally, implies a knowledge of the art itself; yet from only a partial knowledge of any particular art or science, one may be enabled to understand the nature and use of the rules that pertain to it, when these are explained.

Q. How may the use of rules in the operations of scientific invention be best conceived ?

A. By noticing their important use in the mechanical arts. In consequence of certain rules acquired by experience, the artist is enabled to command success in all his operations ; while the various attempts of the unskilled workman to attain the same ends, are likely to prove abortive. So in the case of the scientific inquirer, who has no other guide to direct him than his own natural sagacity ; much time and ingenuity must inevitably be thrown away in every exertion of his inventive powers ; whereas by a familiarity with the proper rules and methods of investigation, the power of invention might be enabled to proceed with certainty and steadiness to its object.—*Stew. El.* vol. i. introduction.

Q. How may this analogy be traced yet further ?

A. In the mechanical arts, it is well known how much the natural powers of invention have been assisted by means of tools and instruments. In an equal degree, the intellectual faculties may be aided by means of the proper rules and instruments of investigation ; some of which are here enumerated.

Algebra for example, is one such instrument of thought, of wonderful efficacy in facilitating the inquiries of modern mathematicians. The method of induction is another instrument of investigation, which has turned the attention of the moderns to the proper rules of philosophizing, and has led to the most important discoveries. Again, the physical and geometrical analyses already explained, are, in a peculiar sense, methods of invention in the several sciences to which they are applied. So also, the different modes of reasoning, with their rules, when once understood, are so many means of aiding the understanding in its various attempts to extend its researches and discoveries.

Q. What are the most likely means of introducing similar improvements into the other branches of knowledge ?

A. In proportion as individuals shall carefully record in writing, the most important practical rules which habits of investigation suggest to them, and as these rules shall be systematized and illustrated in works of logic ; the methods of investigation and discovery in the several arts and sciences will be multiplied and improved. By these means, " each generation will be placed in circumstances more favourable to invention than the preceding;" also, successive inquirers will be conducted in a shorter and surer way to knowledge, and thus be enabled to carry out their conclusions on all subjects, many steps beyond their predecessors.

SECTION FOURTH.

THE USES OF METHOD IN AIDING AND IMPROVING MEMORY AND RECOLLECTION

Q. What is memory ?

A. The word memory expresses *that faculty by which we treasure up, and preserve for future use, the knowledge we acquire?*

Q. What is recollection ?

A. *Recollection* is the power of recalling our knowledge when we have occasion to apply it to use.

Q. What may be remarked respecting the several theories that have been in use to explain the phenomena of memory ?

A. These theories, and the figurative expressions that suggest them, afford no explanation of the phenomena to which they refer.

For instance, the memory at one time has been compared to wax, which, according to its particular texture receives impressions more or less durable. At another time it has been represented as a tablet on which facts are recorded ; and again, " it has been considered as a sort of repository in which we arrange and preserve for future use the materials of our information."

Now these and all other attempts to explain the phenomena of thought, by the laws of matter, are ineffectual and irrelevant to the subject ; the real operations of memory may be entirely unlike any of them.

Q. How may the powers and operations of memory be explained and accounted for in a different manner ?

A. The first power of memory, viz. that of retaining the ideas we have acquired ; is, in other words, a facility which the mind acquires of reviving its ideas, by repeating former operations of thought very rapidly.

The second, viz. the power of recalling them in their connexions, when they have once passed the mind, is in consequence of their previous associations. The third branch of memory is, a power of recognising as former objects of attention, the thoughts that from time to time occur to us: nothing more is necessary to account for the several operations of memory, as it is concerned about the materials of our knowledge. The supposition of a stock of ideas being treasured up and dormant in the mind, as the furniture of memory, other than those about which our minds are immediately employed, and of which we are conscious at the time, is wholly gratuitous and without foundation.

Q. What is the purpose of method as it regards memory and recollection?

A. The purpose to be answered by method is, the securing to the mind a command over the knowledge it has acquired.

Q. How does it appear that methodical arrangement is the chief instrument in aiding and improving memory?

A. This is an admitted principle in every contrivance and plan of artificial memory which has been devised: they all pursue some methodical arrangement, according to which the subjects of our knowledge are to be distributed by the mind, in order to the better retention and recollection of them. Every man's experience attests the utility of a method of some sort, for subserving the purposes of memory.

Q. On what two principles of our nature does memory depend?

A. The first is *attention*, without which even the objects of our perception make no impression on the memory; and much less, those that are addressed to the understanding either in reading or hearing.

The second principle on which memory depends, is the association of ideas.

Q. How is memory dependent on the principle of association of ideas?

A. The association of ideas, i. e. *the tendency of one thought to introduce another into the mind;* is a principle which operates in every act of memory and recollection, Some have maintained, that without this associating principle, no thought, after it has once passed the mind, could ever be recalled by an act of the will.

Q. How does this principle shew the importance of methodical arrangement in aiding memory ?

A. The ideas pertaining to every branch of knowledge are connected together by some particular associating principle ; in one science for example, by associations of cause and effect ; in another, by associations founded on the necessary relations of mathematical truths ; in a third, by associations founded on contiguity, or nearness of time and place ; while in other instances, resemblance and contrariety are the associating principles.—*Stewart, Ele.* vol. 1. chap. 6. sec. 3.

When, therefore, our ideas are arranged according to these several relations, they are easily retained and recalled by the mind.

Q. Since every object of our knowledge is related to a variety of others, and therefore may be presented to the thoughts, by the several principles of association, what important consequences follow from these facts ?

A. Hence the greater the number of relations among our ideas, and the more perfect the arrangement of them, the greater will be the number of occasions on which they will recur to the recollection. and the more firmly will each idea be fixed in the memory.

Q. What is a second consequence ?

A. It also follows, that the facility of retaining a new fact, or a new idea, will depend on the number of relations which it bears to the former objects of our knowledge ; so that every new acquisition, instead of loading the memory, serves to give it a firmer hold of that part of our previous information, with which it is in any degree connected.—*Stewart, ibid.*

Q. What examples may serve to illustrate the truth of these remarks ?

A. As an instance of this, every one who has read the biographies of eminent men, who were associates in life, and whose histories are interwoven, has found, that in proportion to the number of lives with which he became acquainted, his knowledge of each individual has been increased ; and the multiplication of relations between them, when once discovered, has tended to fix the whole more firmly in his memory.

On the same principle we find that studying any one branch of knowledge or science, increases our acquaintance with the rest, by reason of that *commune vinculum,** by which the several sciences are connected together.

Q. What are the three qualities of a good memory ?

A. The first is, to be *susceptible ;* the second is, to be *retentive ;* the third is, to be *ready.* It is but rarely, (says Mr. Stewart,) that these three qualities are united in the same person.

Q. On what does susceptibility of memory chiefly depend ?

A. We commonly remember any thing the more easily, in proportion as it interests us, and engages our attention. " If an object does not interest some principle of our nature, we may examine it again and again, with a wish to treasure up the knowledge of it in the mind, without our being able to command that degree of attention which may lead us to recognise it the next time we see it." Accordingly, ideas of pleasure and pain are easily remembered, because they deeply interest us, and arrest our attention.

Q. On what does retentiveness or tenaciousness of memory depend ?

A. It depends principally on a disposition to system and to philosophical arrangement.—*Stewart, ibid.*

The most effectual way to fix the particulars of our knowledge very permanently in memory, is to refer them to general principles.

This method the man of philosophical habits adopts, while the man of business and the mere man of detail, associates his ideas according to their more obvious relations ; those for example, of resemblance, and of contiguity in time and place.

Q. What difference results between the two cases ?

A. The ideas of the latter, connected together by these casual relations, present themselves with readiness to the mind, so long as he is forced by the habits of his situation to apply them to daily use ; but when a change of place or of occupation leads him to vary the objects of his attention, he finds his old ideas gradually to escape from the recollection.

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* Cicero.

The case is very different with the former, whose ideas have been philosophically arranged and referred to general principles. Some time and reflection will frequently be necessary to enable him to recollect them, but he always knows where he is to search for them ; and the information which he has once completely acquired in this way, continues in general to be an acquisition for life.—*Ibid.*

Q. How are the powers of memory aided by arranging the subjects of our knowledge under distinct heads ?

A. With such an arrangement, by charging the mind with some leading objects only, in each class ; the recollection of particulars is rendered more easy, and the burden of memory is diminished ?

Q. How is this subject further illustrated ?

A. Thus, for instance, when the several arguments and proofs by which any doctrine or general truth is supported, have been digested under their general heads ; or, when the facts and particular truths on which inductive conclusions are founded, are referred each to its appropriate general principle ; such a methodical arrangement enables the memory to recall the several particulars in connexion with their general heads in consequence of the associating principle.

Q. How may the advantages which the memory derives from a proper classification of our ideas, be best conceived ?

A. By attending to its effects in enabling men to conduct with ease any important business.

The dexterity and despatch with which many have managed the various parts of a complicated business, either in the official, professional, or more active departments of life, can no otherwise be accounted for, than by a superior method and arrangement to which they had attained ; assigning to each particular the proper order, of time or place, in which it was to come under review.

Cor. Hence, in proportion as our knowledge is properly systematized, the time and labour are abridged which must otherwise be employed, in searching at random amidst a chaos of particulars.

The mind in this case is charged only with a comparatively small number of general principles, instead of a multitude of detached facts and solitary truths; each of which would have been as burdensome to the memory, as the general principle with which it is connected.—*Stew.* chap. 4. sec. 3.

Q. Is memory then susceptible of great improvement by culture?

A. In no one faculty of the mind are the effects of culture more remarkable than in the case of memory. The improvement which the original faculty acquires by mere exercise is a well known fact, but of this fact no explanation can be given. But in addition to this, memory may be greatly aided in its operations, by those expedients which reason and experience suggest for employing it to the best advantage. Of these expedients, the most important have already been considered.

Q. What one peculiar disadvantage results from the want of a methodical arrangement of our knowledge?

A. The multitude of ideas and facts in the minds of many persons, for the want of arrangement, not only disqualifies them for preserving any due method in speaking and writing; but in proportion to the number that offer themselves at once to the view, is the difficulty of unravelling them in their proper order, for the purpose of speech and composition.

Q. How is this difficulty the most successfully remedied?

A. By frequent composition, with a careful attention to method in the division and arrangement of the several subjects; by which means, we become accustomed to the consideration of the parts separately, and without confusion.

Q. What advantage in the communication of our knowledge may be noticed as resulting from method?

A. He who has his knowledge systematically arranged, is enabled to communicate it to others whether in speech or in writing, in a methodical and perspicuous manner; without which, with all his acquisitions, he will fail either to interest, instruct, or persuade.

Q. What are the best means of obtaining a just method in the conduct and management of a discourse?

A. The means best adapted to this end, are, careful composition and a study of the best models. Nevertheless, there are certain rules and precepts directing to such a method as is according to sound judgment and correct taste, and pointing out what is faulty; which are excellent helps for acquiring a proper skill and management in the several departments of composition.

The particular consideration of these, becomes the province of the rhetorician, and does not make a part of a system of Logic.

For information on this subject, the learner is referred to Dr. Blair's Lectures on Rhetoric, where it is handled in all its parts in a masterly manner.

Q. What important remark has Mr. Stewart relative to method in reading?

A. "Nothing (says he) has such a tendency to weaken, not only the powers of invention, but the intellectual powers in general, as a habit of extensive and various reading without reflection. The activity and force of the mind are gradually impaired, in consequence of disuse, and not unfrequently, all our principles and opinions come to be lost, in the infinite multiplicity and discordancy of our acquired ideas."—Vol. 1. chap. 1. sec. 6.

In connexion with this, it may be safely affirmed, that a habit of promiscuous and desultory reading without regard to system and method, however long continued, will contribute but little towards mental improvement, or to the increase of one's stock of real and useful knowledge.

CONCLUDING OBSERVATIONS.

Q. *Lastly;* what may be mentioned as another important purpose of method?

A. This purpose is, to enable us to connect the several principles and doctrines pertaining to any science in a regular system.

After truths have been investigated singly, by a careful examination of their proofs; another important process is, to arrange them in a systematic manner, so that they may be viewed in their dependence and mutual relations to each other.

Q. What are some of the advantages of having our knowledge disposed in an orderly system?

A. In this order of regular dependence and connexion, the several truths receive additional support and confirmation, from the mutual agreement and consistency which is discovered to subsist between them.

It has been shewn, that one operation of reasoning consists in determining the truth or falsehood of propositions, from their agreement or disagreement with other known truths. So in this case, the discovered agreement and consistency of any one principle or article of the system, with others that are known truths, is a proof of its correctness; as every instance of a contrary nature, is a proof of the incorrectness or falsehood of such principle.

Q. What is one prerequisite to such an arrangement of truths in a system ?

A. The principal prerequisite is, that the several truths, together with their proofs, be first investigated and clearly understood; since a consistent knowledge and arrangement of the whole, depends upon a knowledge of the parts of which it is composed. Men accustomed to thinking and investigation, after having acquired the principles of any science, or system of truth, seldom fail to connect and arrange them according to some method. The forming of the parts into a system, is easy in comparison of the investigation of them separately; and is indeed little else, than being able to take a comprehensive view of the elementary truths and principles of the science. considered in their subordination and relations to each other.

Q. In what manner is this methodical arrangement to be successfully attained ?

A. The only effectual method is, by making ourselves acquainted with the different branches of knowledge in their elementary parts and general principles. We may commence with one single science, and after a thorough acquaintance with this, and a systematic arrangement of its several parts; we shall be enabled the better to succeed in acquiring and arranging the materials of any other system.

Thus, an individual from an acquaintance with grammar, and an arrangement of its principles and rules, is often assisted and prompted by his love of systematic arrangement, acquired in this study; to attempt a similar method in regard to other branches of knowledge.

Q. How may one avail himself of all the advantages of method, which we have already enumerated ?

A. In order to this, he must obtain a knowledge of the different sciences; in doing which, he will acquire by practice, those habits of systematical thinking and arrangement, which will increase his capacity for investigation, and will put him in possession of those various rules and methods of invention, by means of which, he may proceed more successfully in the discovery of truth, and in the communication of it to others. In the mean time, his habitual attention to system and classification, will tend to give his memory the most durable hold, and ready command, of the knowledge he has acquired.

Q. What advantages may be derived from studying the best models of arrangement ?

A. Such models of arrangement, either in systems or in individual subjects, are of use, by exhibiting to the mind the proper objects of its imitation, and by conveying conceptions of just method. Yet, these models cannot be imitated with success, to any great extent, in our own practice.

After studying an author's plan of arrangement ever so carefully, the ideas we acquire from it, in order to become our own, must be arranged in our minds in that order which is most agreeable to our habits of association. The following illustration of Mr. Stewart in a similar case, is applicable to the present subject. "The only method of putting our acquired knowledge on a level in this respect, with our own original speculations, is, after making ourselves acquainted with our author's ideas, to study the subject over again in our own way ; to recollect what the propositions are which the author wishes to establish, and to examine the different proofs which he employs to support them. In making such an experiment, we find that the different steps of the process arrange themselves in our minds, in a manner different from that in which the author has stated them. When we have reduced the reasoning to that form which appears to ourselves to be the most natural and satisfactory, we may conclude with certainty, not that this form is better in itself than any other, but that it is best adapted to our memory."—Vol. 1. chap. 6. sec. 5.

Q. What inference may be drawn from these remarks ?

A It follows from the above remarks, that in most works of science, a very close connexion of the parts is not important to the learner, for enabling him to connect and arrange the several subjects, after he has acquired the knowledge of them. So the subjects of logic may be learned with advantage in a more detached manner; and when the learner has gained a knowledge of the various particulars, separately explained, he may afterwards connect and arrange them for himself, according to his own habits of association.

Ob. Having "the materials of our knowledge arranged *in the mind*," is an expression entirely figurative, which the poverty of language obliges us to use in speaking on the subject of memory. The more correct theory may be suggested by an explanation like the following; by an habitual attention to classification and arrangement among the subjects of our knowledge, they at length receive such a systematic form. that the mind is enabled to retrace them in their proper order, and recall the several particulars in their connexion, in consequence of previous associations. This neither supposes the memory to be a repository, nor that the materials of our knowledge have their place and arrangement in the mind.

Q. What is a useful method of improving our knowledge and arrangement of the different sciences?

A. For this purpose, it is useful to consult those authors who have attempted a division of the sciences, by defining the outlines and peculiar province of each, and by shewing their relations and subserviency to one other.

Such a synopsis of the general field of science, with the lines of demarcation, assists the mind in tracing the respective boundaries and divisions; while it exhibits the subjects of human knowledge in their extent, symmetry, and connexion.

This brief explanation of the nature of method in general, of the purposes to be answered by it, and of the manner in which it is to be acquired; may suffice to shew the reader its importance, and also how he may avail himself of its several advantages.

FINIS.